Distr.
LIMITED
E/ESCWA/AGR/1996/2
8 January 1997
ORIGINAL: ENGLISH

EVALUATION OF THE AGRICULTURAL POLICIES IN THE HASHEMITE KINGDOM OF JORDAN (POLICY ANALYSIS MATRIX APPROACH)

UNITED NATIONS
New York, 1997

- Issued as submitted.

97-0021

PREFACE

The present study was initiated by the United Nations Economic and Social Commission for Western Asia (ESCWA) and the German Agency for Technical Cooperation (GTZ) in close collaboration with the Ministry of Agriculture in Jordan. The First Economic Affairs Officer in the Agriculture Section of ESCWA served as a coordinator and team leader and in collaboration with Messrs. M. S. El-Habbab and A. S. Jabbarin jointly analyzed the data and prepared this study.

The study has had two main objectives. First, it was expected that the study would identify policy induced distortions in the agriculture sector, and determine comparative advantage of major crops as well as recommend alternative policy options for eliminating distortions from agriculture, with the aim of encouraging competitiveness and enhancing efficiency. Second, it was anticipated that the spreadsheet computer model constructed for the analysis of policy matrices would serve as an operational tool for the monitoring of agricultural policies in the future as well.

The Policy Analysis Matrix (PAM) was used as an analytical tool to analyze the data. The PAM approach to agricultural policy analysis provides decision-makers and analysts with both a helpful conceptual construct for understanding the effects of policy and a useful technique for measuring the magnitude of distortions. The PAM measures the competitiveness, efficiency and effect of policy-induced changes.

The study dealt with the evaluation of agricultural policies in Jordan, with special focus on commodity, factor and macro-economic and trade policy linkages. The impact of these policies on agriculture was assessed. The study is expected to facilitate the formulation of future price and trade policies, as it reveals the extent of policy distortions in agriculture and estimates the comparative advantage of each crop.

It has to be emphasized that the Government of Jordan has initiated a number of policy reforms and measures to liberalize the pricing systems and trading regimes. The reform process as such is an ongoing exercise and some of the changes introduced lately may not be captured by the data in the study because of the time lag in the production cycle of the agricultural produce the effect of which will take longer time to be materialized. As such, the findings in this study represent a base case scenario and the effect of changes introduced through the agricultural sector adjustment program to be monitored and evaluated at regular intervals. In this context, the computer model developed for the study provides a viable analytical framework if updated periodically will make it possible for policy analysts to assess the impact of the structural adjustment program at the farm level regularly. Furthermore, it is expected that the study and its computer model to serve the needs of numerous potential users, such as policy makers, policy analysts as well as instructors in training institutions.

CONTENTS

LIST OF TABLES

CONTENTS (continued)

ACRONYMS

ACC:	Agricultural Credit Corporation
AMO:	Agricultural Marketing Organization
AMPCO:	Agricultural Marketing and Processing Company
APC:	Agricultural Policy Charter
ASAL:	Agriculture Sector Adjustment Loan
ASAP:	Agriculture Sector Adjustment Program
ASTAP:	Agriculture Sector Technical Assistance Project
CBJ:	Central Bank of Jordan
CIF:	Cost, Insurance and Freight
DOS:	Department of Statistics
DRC:	Domestic Resource Cost Ratio
EEC:	European Economic Community
EER:	Equilibrium Exchange Rate
EPC:	Effective Protection Coefficient
EPP:	Export Parity Price
ESCWA:	Economic and Social Commission for Western Asia
FAO:	Food and Agricultural Organization of the United Nations
FOB:	Free On Board
GATT:	General Agreement on Tariffs and Trade
GDP:	Gross Domestic Product
GTZ:	German Agency for Technical Cooperation
HCP:	Handling Costs at Port of Entry
ICARDA:	International Center for Agricultural Research in the Dry Land Areas
IBRD:	International Bank for Reconstruction and Development
IMF:	International Monetary Fund
IPP:	Import Parity Price
JEDCO:	Jordan Export Development and Commercial Centers Corporation
JD:	Jordanian Dinar
JRV:	Jordan Rift Valley
JVA:	Jordan Valley Authority
MC:	Marketing Costs
MCM:	Million Cubic Meter
mm:	Millimeter
MOA:	Ministry of Agriculture
MOS:	Ministry of Supply
MTD:	Measure of Total Distortions
MWI:	Ministry of Water and Irrigation
NCARTT:	National Center for Agricultural Research and Technology Transfer
NENARACA:	Near East-North Africa Regional Agricultural Credit Association
NPC:	Nominal Protection Coefficient
OIAD:	Office for Integrated Agricultural Development
OPP:	Observed Port of Entry Price
PAM:	Policy Analysis Matrix
PC:	Profitability Coefficient
PCR:	Private Cost Ratio

ACRONYMS (continued)

PVA:	Private Value Added
SAP:	Structural Adjustment Program
SCF:	Standard Conversion Factor
SDR:	Special Drawing Right
SVA:	Social Value Added
TCBM:	Transport Cost from Border to Market
TCFM:	Transport Cost from Farm to Market
TPC:	Total Processing Cost at the Factory
UAE:	United Arab Emirates
USAID:	United States Agency for International Development
WAJ:	Water Authority of Jordan
WB:	The World Bank
WTO:	World Trade Organization

I. INTRODUCTION

A. GEOGRAPHIC FEATURES

The total area of Jordan is about 89.3 thousand square kilometers. Jordan borders Syria on the north, Iraq on the east, Saudi Arabia on the south, and Palestine on the west. It is an arid to semi-arid country. A mountainous range runs from the north to the south. To the east, the land slopes gently to form the eastern deserts; to the west, the land slopes steeply towards the Jordan Rift Valley which extends from Lake Tiberias in the north (at a land elevation of 220m below sea level) to the Red Sea at Aqaba. About 120 km south of Lake Tiberias lies the Dead Sea, with a water level of approximately 400 m below sea level. The southern ghors and Wadi Araba, south of the Dead Sea, form the southern part of the Rift Valley. To the south of the Wadi Araba region lies a 25 km coastline forming the northern shores of the Red Sea.

Due to the variable topographic features of Jordan, rainfall distribution varies considerably with location. Annual rainfall intensities range from a high of 600 mm in the northwest to less than 200 mm in the eastern and southern deserts, which form about 91% of the surface area. Jordan's average rainfall amounts to about 8425 MCM/year, varying between 6235 and 10630 MCM/year. Approximately 92.2% of the rainfall evaporates, while the rest flows in rivers and wadis (streams) as flood flows and recharge to groundwater. Groundwater recharge amounts to approximately 5.4 % of the total rainfall, while surface water accounts for approximately 2.4%.[1]

Out of the 89.3 million dunums total area of Jordan, only 5 million dunums are cultivated. Most of this cultivated land is located in the Highlands. Rainfed agriculture occupies about 4.5 million dunums, and irrigated agriculture covers about 340.6 thousand dunums in the Jordan Rift Valley, and 295 thousand dunums in the Highlands. There are about 90 thousand farms in Jordan and about 100 thousand farmers and livestock producers.

Topographically, Jordan is divided into four Agro-climatical Zones:

1. The Jordan Rift valley which occupies the depression that extends from Lake Tiberias in the north (212 m below Sea level) to the Dead Sea (394 meters below sea level) and to the Gulf of Aqaba in the south.

2. The Highlands, a narrow distinctive area, that lie almost parallel to the west side of the Jordan Rift Valley. The total area of this zone is about 5.5 million dunums, mostly rainfed. The area allocated to forest and rangelands is about 3.0 million dunums, whereas about 2.5 million dunums are cultivated with field crops, vegetables and fruit trees.

3. The Marginal Lands (Steppe) located to the east of the Highlands, border Syria on the north, Azraq and Wadi Sirhan Basin on the east, and Ras El Naqab on the south.

---

[1] M. Bilbeisy, *"Jordan's Water Resources and the Expected Domestic Demand by the years 2000 and 2010: Detailed According to Area"*, in " Jordan's Water Resources and Their Future Potential", Proceedings of the Symposium 27th and 28th October 1991, Amman, Jordan, 1992, pp. 7-9.

Major range land of Jordan is located in this zone.

4. The Desert Zone (Badia) which is located to the east side of the Steppe, extends eastward to the Saudi Arabian and Iraqi borders.

According to the availability of water , the land of Jordan can also be divided into five Agro-Climatic Zones as shown in Table 1.

TABLE 1. LAND AREA IN JORDAN ACCORDING TO AGRO-CLIMATIC ZONES

Zone	Average Annual Rainfall (mm)	Area (Million Dunums)	% of Total Area
Semi-Desert	<200	80.8	90.5
Arid	200-350	5.1	5.7
Semi-Arid	350-500	1.9	2.1
Semi-Humid	>500	1.0	1.1

Source: Ministry of Agriculture, *"National Agricultural Research Strategy,"* Amman, Jordan, 1994, p. 5.

B. LAND USE IN JORDAN

Rangelands in the semi-desert zone constitute about 91% of the land. Of the approximately 81 million dunums of rangelands, about 59 million dunums receive less than 50 mm of rainfall annually, and about 22 million dunums receive between 50 and 200 mm. The rainfall in this area is irregular and of uneven distribution. These lands are in general state of degradation due to harsh environmental conditions, misuse from overgrazing, and the cultivation of marginal areas, Table 2.

It was estimated that, of the approximately five million dunums of agricultural land, four million dunums, or 76%, lie within municipal and village boundaries[2]. This has implications on the use of the land either for agricultural purposes or urban development.

[2] Ministry of Agriculture, *"National Agricultural Research Strategy"*, Amman, Jordan, 1994, p. 79.

There are approximately 410 thousand dunums of natural forests and 350 thousand dunums of forest plantations. Jordan has an active afforestation and reforestation program and has planted an average of 35 thousand dunums annually in recent years.

TABLE 2. LAND USE IN JORDAN

Utilization Pattern	Area (Million Dunums)	% of Total Area
Rangelands	80.7	90.4
Buildings & Public Utilities	1.7	1.9
Forestry	0.7	0.8
Land Registered as Afforested	0.6	0.7
Water Surface	0.5	0.5
Agricultural Land	5.1	5.7
Total	89.3	100.0

Source: Ministry of Agriculture, *"National Agricultural Research Strategy,"* Amman, Jordan, 1994, p. 5.

The total area of registered agricultural land holdings has decreased from 3.7 million dunums in 1975 to 3.4 million dunums in 1983. Most of the land has been used for urban development. The land used for urban development was some of Jordan's best agricultural land. Further urban expansion is also expected to be at the expense of prime agricultural land.

There are no laws that regulate the utilization of agricultural lands in the rainfed areas. Farmers have the right to cultivate their land with crops of their choice or to leave the land idle.

C. WATER RESOURCES IN JORDAN

There are two water resources: surface water and groundwater.Surface water flows permanently in rivers as flood flow, and streams. Permanent river, wadi and spring flows vary monthly and are determined by the quantity and duration of rainfall.

The total flow from all surface water resources in Jordan is 715 MCM, out of which, the base flow constitutes about 353 MCM/year, the flood flow is 332 MCM/year and Spring flow is 255 MCM/year.[3] Jordan's surface water is distributed unevenly in 15 basins, ranging

[3] M. Bilbeisy, *"Jordan's Water Resources and the Expected Domestic Demand by the years 2000 and 2010: Detailed According to Area"*, in " Jordan's Water Resources and Their Future Potential", Proceedings of the Symposium 27th and 28th October 1991, Amman, Jordan, 1992, pp. 11 and 12.

from 285 MCM from Yarmouk and Adasiya basin to 2.2 MCM from the Southern Desert basin.

The Yarmouk Basin accounts for 40% of the total surface water in Jordan. This also includes water contributed from the Syrian part of the Yarmouk Basin. Since this water forms the major tributary of the King Abdullah Canal, it is considered the backbone of development in the Jordan Rift Valley. Other major basins include Zarqa, Jordan River's side wadis, Mujib, Dead Sea, Hasa and Wadi Araba.

The Government has invested heavily in the Development of surface water resources, with priority given to the construction of dams and irrigation projects in the Jordan Rift Valley.

Groundwater constitutes another major source in many parts of Jordan. It is comprised of both renewable and nonrenewable resources. Jordan's groundwater is distributed among 12 basins. Some renewable groundwater resources are presently exploited at maximum capacity -in some cases beyond safe yield- and are approaching the red-line limit of exploitation. Many studies estimate the safe yield of renewable groundwater resources at 275 MCM/year.

The Disi Aquifer in the south of Jordan is the main nonrenewable resource presently exploited. The safe yield of this aquifer is estimated at 125 MCM/year, expected to last for 50 years. Its water quality is generally less than 500 ppm. Other nonrenewable groundwater resources are found in the Jafer Basin in Shidiya, with an annual safe yield of 18 MCM/year.

Intensive irrigation projects were implemented in Jordan in 1958 when the Government decided to divert part of the Yarmouk River water and constructed the East Ghor Canal (now named King Abdullah Canal) project. The canal was 70 km long in 1961 and was extended three times between 1969 and 1987 to 110.7 km.[4]

The Construction of King Abdullah Canal, along with its extension to the south, has put more land under irrigation. In addition, five other dams on side valleys were constructed. They allowed new lands-mostly above the main canal and in the southern ghors-to be irrigated.

Wells were drilled by private sector as well as by the Jordan Valley Authority in the Jordan Rift Valley. These wells have been used for domestic needs and for irrigation. Highlands of Jordan depend mainly on groundwater resources for irrigation.

D. Main Constrains Affecting the Agricultural Sector

Three major constraints (water, producer services, and markets) affect the development of sustainable agriculture in Jordan.

---

[4] M. Bani-Hani, *"Irrigated Agriculture in Jordan"*, in "Jordan's Water Resources and Their Future Potential", Proceedings of the Symposium 27th and 28th October 1991, Amman, Jordan, 1992, p. 31.

Water resources are severely limited and declining both in quantity and quality. The country is largely arid or semi-arid. About 96 percent of the land receives less than 300 mm of precipitation a year. Hence, irrigation is important. Agriculture consumes almost three quarters of the total water. Investment in irrigation in the 1970's and 1980's resulted in intensification and increase of agricultural outputs. This expansion was accompanied by shifts in the cropping patterns in favor of higher value crops which further increased income. However, no additional sources of surface water exist that can be economically harnessed, and the current level of groundwater utilization exceed the renewable limits. Water demand for municipal and industrial use is rising fast and exceeds its supply. Better planning, management, and rational use could safeguard the sustainability of this scarce resource.

Water management problems in Jordan are caused by lack of coherent policy, institutional coordination, overall planning and management capacity and by insufficient attention paid to demand management.

Prices of irrigation water in the public sector have major bearing on the management of water demand, efficiency of water use and water productivity. The use of price as an instrument for encouraging water use efficiency has been under-utilized. Current water charges in the Jordan Rift Valley are only about one quarter of the O&M cost and well below the efficiency price needed to optimize water use.

Agricultural productivity, in terms of returns to water and labor, is relatively high but can be improved further. There is a scope for further improvement in irrigation efficiency in the Jordan Rift Valley, which has irrigation efficiency of only 42% in the northern section now and cropping intensity of only 100-120%. Higher productivity would require improved technology. Education and training of farmers and improvements in the delivery of research, extension and other producer services will further facilitate the adoption of improved technology and increase productivity. It is important to make such services more demand driven and farmer focused.

Markets for Jordanian agricultural produce also pose problems. Exports have historically been dependent on the regional markets. The Gulf markets were the major outlets for horticultural exports of Jordan. Saudi Arabia, Kuwait, the UAE, Qatar and Bahrain together used to import about 500,000 tons of fresh fruits and vegetables from Jordan. The shares exported to other Arab markets and Europe were 62,000 tons and 6,000 tons respectively. Because of the Gulf War, markets in the Gulf have shrunk and export prospects have eroded. Presently, export capability lags behind the production capacity. The local market, although growing fast, is relatively small and cannot absorb all surplus production. As a result, there have been losses and reductions in farmers' incomes.

There is a recognition of the need in Jordan to diversify its export outlets into the relatively more stable, fast growing markets of West Europe. These markets, however, are more quality demanding. Jordan will have to introduce substantial improvements in produce quality, in terms of better standards of production, post-harvest handling and packaging. To serve the European market, Jordan would also need improvements in market information and logistics to monitor the demands of off-season, niche markets in Europe,and to respond to them in time.

A study conducted in 1991,identified twelve crops in which Jordan has a definite commercial potential (strawberry, grapes, asparagus, melons, green beans, eggplants, tomatoes, peppers, peaches, nectarine, cherry and raspberry). The same study recommended off-season exports through niche market windows targeted at four principal European markets (Germany,France, United Kingdom, and Switzerland.[5]

The Jordanian agriculture is faced with a host of problems such as technical, institutional and structural. Current Government policies, on the one hand, have encouraged the rapid growth in production of fruits and vegetables making it possible for Jordan to satisfy domestic needs and export a surplus. On the other hand, policies on inputs subsidies and factors of production have permitted inefficient use of land and water resources. The prospects for the development of the agricultural sector very much depend on its ability to use water with increasing efficiency and to adapt to produce for new markets and to switch to new high value crops.

There is substantial scope for improvements in productivity and profitability within the existing resource limitations, but exceptional measures are needed to bring about the required structural changes in the Jordanian agriculture. For these reasons, the Government has embarked on an adjustment program in the agricultural sector to drive the transition to a more sustainable and efficient use of resources. This program covers improvements in the management of water and land resources, market liberalization and institutional development.

II. MAIN AGRICULTURAL PRODUCTS BALANCE SHEETS

A. VEGETABLES

At present, Jordan is far more than self-sufficient in most vegetables. The production of vegetables exceeds domestic consumption and constitutes the major volume of agricultural exports and earner of foreign exchange. The net self sufficiency rates during the period 85-90 for tomatoes, eggplants, cucumbers, peppers, and squash were 213, 198, 194, 385, and 168 percent respectively. During 91-94, the self-sufficiency rates for the same crops were 146, 145, 133, 259, and 131 percent respectively (Annex A).

On the other hand, Jordan is a net importer of potatoes and onions. The self sufficiency rates for the period 1985-90, of the two crops were 93 and 73 percent respectively, and for the period 1991-94 they were 97 and 85 percent.

B. FRUITS

Although Jordan imported large quantities of citrus during the last decade, especially from the Gaza Strip and the West Bank, its self sufficiency rate was more than 100 percent. This was caused by exporting larger quantities of citrus, mainly to the Gulf states. Self-sufficiency of citrus increased from 114 percent during 1985-90 to 141 percent during 1991-94.

---

[5] K. M. Harrison and A. Jabbarin, *"Evaluation of the Economic Benefits of Horticultural Exports to Europe"*, Sigma One Corporation, August 1991.

Jordan does not export bananas, on the contrary it imports about 15 percent of its needs from the West Bank. Lately, it started importing bananas from the Philippines and Ecuador.

Jordan imports and exports grapes. It imports some varieties of grapes, mainly late grapes, from the West Bank, Syria and Lebanon. The self-sufficiency rate during 1985-90 was 94 percent, it increased to 100 percent during 1991-94.

Olive production fluctuates due to its alternate bearing cycle. The total production in 1992 was about 14 thousand tons, it dropped to 8.5 thousand tons in 1993, then it increased to 15.6 thousand tons in 1994. The self sufficiency rate for pickled olive during 1985-90 was 99 percent, it dropped to 95 percent during the period 1991-94. On the other hand, the self sufficiency rates of olive oil during the same periods were 56 and 70 percent respectively.

C. Field Crops

Jordan is not self sufficient in the production of wheat and barley. The average annual consumption of wheat during the last decade was about 653 thousand tons, of which only 13 percent was produced locally. The largest quantities produced locally was in 1988 (about 137 thousand tons) and the lowest was about 40 thousand tons in 1986. The self sufficiency rate of wheat during 1985-1990 was about 14 percent, it dropped to 11 percent during 1991-1994.

Jordan imported about 82 percent of its barley requirements during 1985-90, and imported about 88 percent during 1991-94. The self sufficiency rate ranged from 18 percent during 1985-1990 to 12 percent during 1991-1994.

III. ROLE OF AGRICULTURE IN NATIONAL DEVELOPMENT

The agricultural sector in Jordan is considered small in relation to the overall economy, but it is relatively important in the production of tradable goods. Agriculture contributes on average 7.3% of Jordan's GDP, employs 10% of the work force, and accounts for 15% of total exports. Backward and forward linkages between agriculture and overall economy are strong. When these linkages are considered (inputs,producer services,marketing and processing) agriculture contributes 29% of GDP. The Components of agribusiness activities and the percentage contribution to GDP are: agribusiness services (9 percent), inputs (8 percent), agro-industry (5 percent). The agro-industry portion includes food, beverages and tobacco processing, while the services portion includes items such as trade, transport, financial, business and governmental services.[6]

During the period 1986 to 1992, the value of crop production rose from JD 95.6 million to JD 199.2 million, then dropped in 1993 to JD 156 million (Table 3). The value of livestock products followed the same pattern as crops. It increased from JD 85 million to JD 312 million during the period 1986-1992, then dropped to JD 201.2 million in 1993.

---

[6] Abt Association et al, *"The Contribution of Agribusiness to National Income and Employment in Jordan"*, APAP II Technical Report, No, 131, Prepared for USAID/Amman, June 1993.

Jordan achieved a decade of rapid growth raising its per capita income from US $ 380 in 1973 to US $ 1690 in 1982. Stagnation since then has steadily reduced the per capita income to US $ 1057 in 1991, which in real terms was less than half of the 1982 level.[7] After that, the Jordanian Economy started to recover. The per capita income increased to US$ 1324 in 1993 and to US$ 1498 in 1995.[8] The sharp fluctuation in income, to a large extent, resulted from the fall in oil prices and incomes of neighboring oil exporting countries, which until the Gulf Crisis, provided Jordan with large financial assistance (US $ 600 million per year on average during 1984-88), markets for most of its exports, and employment for a large number of its workers.

Overdependence on regional markets, limited resource base, and its past economic policy orientation, created extremely narrow economic structure for Jordan and exposed it to the vulnerability of external shocks. This vulnerability has been enhanced by the rigidities in the economy and by the deteriorating investment efficiency.

TABLE 3. VALUE OF CROP AND LIVESTOCK PRODUCTS ESTIMATED AT CURRENT PRICES
(Million JD)

Commodity	1986	1987	1988	1989	1990	1991	1992	1993
Crops (Sub-Total1)	**95.6**	**117.6**	**106.5**	**121.8**	**168.8**	**169.7**	**199.2**	**156**
Grains	6.0	16.6	18.6	15.5	21.6	14.2	22.0	14.9
Vegetables	56.0	61.8	41.4	53.7	77.6	77.3	97.6	66.1
Fruits	29.9	34.2	39.5	48.0	64.2	74.2	71.0	67.7
Tobacco	1.5	2.5	3.1	2.5	2.5	1.2	3.5	3.9
Forest Products	0.6	0.6	0.2	0.3	0.3	0.4	0.2	0.2
Seedlings	1.6	1.8	3.7	1.8	2.6	2.4	5.0	3.2
Livestock (Sub-Total 2)	**85.0**	**90.2**	**98.7**	**106.7**	**223.0**	**254.4**	**313.3**	**201.2**
Animal	13.3	14.7	19.6	25.4	76.3	76.1	104.1	92.5
Milk	8.5	10.2	11.0	14.6	59.2	48.3	88.3	65.5
Wool	1.2	1.5	1.6	1.9	3.1	3.3	3.5	2.3
Honey	0.4	0.7	0.8	1.0	1.2	0.6	0.1	0.5
Poultry	58.5	60.0	62.7	60.9	79.8	123.2	114.9	38.6
Fish	0.0	0.0	0.1	0.2	2.4	1.9	1.4	0.9
Organic manure	3.0	3.0	2.9	2.7	1.0	1.0	1.0	1.2
Grand Total	**180.5**	**207.8**	**205.1**	**228.5**	**391.8**	**424.8**	**511.4**	**400.4**

Source: Department of Statistics, *"Annual Agricultural Statistics"*, Several Issues, Amman, Jordan.

---

7. The World Bank, *"Agriculture Sector Adjustment Loan":* Draft Initiating Memorandum, February, 1994, p. 1.

8 The Central Bank of Jordan, *"Annual Report - 1995"*, vol 32, P. 8.

IV. POLICY FRAMEWORK AND THE AGRICULTURAL SECTOR

A. EXCHANGE RATE POLICIES

The exchange rate policies have undergone several changes since 1975. In that year, the Jordanian Dinar was stabilized against the Special Drawing Right (SDR) at a rate of SDR = JD 0.387754, but was allowed to fluctuate within a range of plus or minus 2.25 percent. The exchange rate with respect to other currencies in the SDR basket would then be adjusted using the appropriate cross rates in the international financial markets.

In 1984, the Jordanian Dinar was allowed to fluctuate within a wider range, and in 1986 the financial institutions were allowed to quote their own exchange rates using the Central Bank of Jordan (CBJ) rate as a guide.

In the middle of 1989, the CBJ introduced a two-tier exchange rate market. Banks were free to transact at market rates with the stipulation that they were to use the official rate for imports of subsidized food, medicine and fees for Jordanian students studying abroad. At the end of 1989, the CBJ devaluated the Jordanian Dinar by unifying the two-tier system but continued to monitor the relation between the JD and the SDR at intervals .

In December 1994, the official buying and selling rates quoted by the CBJ were JD 0.697 and JD 0.699, respectively, per one US$. However, there were two exchange rates: the official exchange rate which was determined by the CBJ and a free market rate which was largely determined by the banking system. However, the spread between the two rates has been minimal.

In November 1995, the CBJ stabilized the JD against the US$ only and let it fluctuate with respect to other currencies. The fixed exchange rate was JD 0.709 per one US$.[9]

New arrangements were set to organize the present foreign exchange and capital control system. The amount of foreign exchange that could be taken out of the country or transferred abroad by residents and non-residents annually has become the equivalent of JD 35 thousands. Importers are required to obtain a foreign exchange permit from the CBJ, which is granted automatically when an import license has been obtained. Importers to the free zones and transit trade, on the other hand, are responsible to provide foreign currencies to finance such transactions.

The transfer of funds for the purpose of investing in Arab countries by individual investors is permitted only if mutual or bilateral agreement existed between Jordan and the Arab country invested in, and it is the investors' responsibility to provide foreign currency to finance such investments. However, income resulting from non-resident investments in Jordan may be transferred abroad.

The devaluation policy has been followed to reduce the problem of external imbalance (current account deficit) as well as internal imbalance (persistent high unemployment).

---

[9] The Central Bank of Jordan, *"Annual Report - 1995"*, vol 32, P. 45.

Moreover, currency devaluation is a valuable policy option through which the authorities can safeguard against a worsening of the trade deficit and the unemployment problems that may occur in response to further liberalization of trade. This policy caused an increase in input prices, and thus the cost of production since Jordan is highly dependent on foreign inputs in production and that there is a limited substitutability between domestic and imported inputs like machinery and equipment. Also Jordan is highly indebted and that devaluation increased the debt and debt service burden when measured in Jordanian Dinars. In addition, Jordan is characterized by excess labor and the rigidity of wages. A devaluation is, therefore, capable of reducing real wages at least in the short-to-medium term, and Jordan earns a considerable amount of its export revenues through exports and labor earnings.

B. Price Policies

Price controls are enforced by the Government through direct intervention or through controls on quantities available in the market, principally by means of a monopoly on imports or through domestic procurements. Prices are announced for an unspecified time period and are determined for the several levels of the marketing chain.

Ministry of Supply (MOS) is responsible for fixing of food prices and follow up of their implementation. Pricing methodologies differ according to the groups of commodities. The first methodology is letting prices fluctuate according to supply and demand conditions. Wholesale prices of fruits and vegetables are decided according to this method. The second pricing methodology is on the basis of cost. This method is mainly implemented for locally processed foods, dairy products, table eggs,soft drinks, etc. Also pricing of most imported foods follow the second pricing methodology. Subsidy on food prices (flour, sugar, rice, and dry milk) is determined by the MOS and financed by treasury.

On the other hand, the Jordanian fruit and vegetable retail price control program is different. Every day a two-tier retail price (often referred to as "upper" and "lower" retail prices) is announced, based on a summary wholesale prices of the previous day. Intervention in fruit and vegetable prices is in the form of control of the gross margin at the retail level. The members of the price committee in Amman admit that the margin added to retail prices varies from 10 to 100 percent. The committee is convinced that retail prices today will be a major determinant of the wholesale price tomorrow. Therefore, when they wish to raise the price as an assistance to producers, they apply somewhat higher margins when prices are too low. But when they wish to protect the consumer they apply somewhat lower margins when prices are too high.

A study conducted in 1990[10] found that the retail price control policy has major impacts on the marketing of fruits and vegetables in Jordan. These include: 1) hindering the development of a well defined system of quality grades and standards, affecting both the quality of the product supplied to the market and the range of commodities available to the consumer, and 2) the distortion of prices at both the wholesale and retail levels of the marketing chain, through the lack of an effective price discovery mechanism and the existence of market manipulation.

---

[10] N. A. Quezada and L. C. Brown, *"Evaluation of the Impact of Price Regulation on Fruit and Vegetable Marketing in Jordan"*, Agricultural Marketing Organization, Feb. 1990.

The price control program is one major factor inhibiting the development of modern sorting and grading practices in Jordan. The market signals which the producers of fruits and vegetables receive do not motivate them to improve the quality of produce which they are sending to the market. This includes improvements in production practices as well as harvesting, handling, grading and transportation. Without a proper pricing system that will permit price differentiation according to strict quality standards, the fruit and vegetable producers will not make the effort of investment required to affect the change. Similarly, retailers have no reason to pay higher prices for higher quality products, since they can legally sell everything at the upper retail price anyway. Actually, there is an incentive for retailers to hide the higher quality produce to be sold at an even higher prices to trusted customers who want and are willing to pay for that higher quality.

The effects of price intervention were analyzed in a study conducted by ESCWA & FAO.[11] Annexes (4&5) of the study summarizes the results of the short run effects of total price intervention on consumption of wheat and broilers for the period 1983 to 1992, of sugar and rice for the period 1983-1990, and of red meat and milk for the period 1983-1991.

The percentage change in consumption of wheat fluctuated from year to year. The highest was 36.74 percent in 1991, followed by 31.08 percent in 1992. The rates in absolute values for wheat were generally higher than those for the other commodities owing to the higher level of consumption of wheat.

In General, policies on subsidy regarding wheat have resulted in consumption gains ranging from 37,200 tons in 1987 to 168,000 tons in 1991. However, consumer loss owing to implicit taxation of sugar, rice, mutton, broilers and milk was sizable during the same period.

C. Trade Policies

1. Import policies

Jordan's import regime was restrictive and characterized by high tariff and non-tariff barriers in the 1980s. This was a reflection of the import substitution strategy and high protection which led to considerable anti-export bias. Since late 1988, there has been a notable change in the direction of trade liberalization through gradual reduction of tariff and non-tariff import restrictions.

Tariff duties in Jordan have had three purposes, namely, to protect import substitution industries, to raise Government revenues, and to influence domestic savings and consumption.

---

[11] ESCWA & FAO, *"The impact of the Structural Adjustment Programme on Food Production, Supply and Consumption in Jordan"*, United Nations, 1995, p. 65.

The main objectives of the tariff reform program that was initiated in late 1988 were to have a more uniform tariff regime while at the same time ensuring revenue neutrality. This was to be achieved by increasing the level of the lowest tariffs and decreasing the levels of highest tariffs, and in turn, to reduce the discrimination implied by a more differentiated tariff structure .

Table 4 lists information on tariff rates, surcharges and nominal protection that were prevailing in 1993. The highest tariffs and surcharges were imposed on beverages amounting to 103.9 percent and 19.7 percent respectively. The tariffs and surcharges imposed on agriculture amounted to 10.5 percent and 13.2 percent respectively. The nominal protection on the processed food was 32 percent (tariffs plus surcharges 16.3 and 15.7 percent respectively).

TABLE 4. UNWEIGHTED AVERAGE OF TARIFFS, SURCHARGES AND NOMINAL PROTECTION IN JORDAN, 1993

Industry	Tariff	Sur-charges	Nominal Protection	Max	Coef. of Variation
Agriculture	10.5	13.2	23.7	100.2	81.9
Mining	9.3	12.9	22.2	170.2	145.3
Manufacturing	17.9	16.4	34.3	340.2	88.8
Processed Food	16.3	15.7	32.0	100.2	66.9
Beverages	103.9	19.7	123.6	180.2	55.5
Overall Economy	16.8	16.1	32.9	340.2	91.0
Consumer Goods	24.9	17.8	42.7	340.2	96.3
Intermediate Goods	8.4	15.0	23.4	170.2	70.2
Capital Goods	21.3	16.1	37.9	160.2	54.3

Source: The World Bank, *"Jordan-Consolidating Economic Adjustment and Establishing the Base for Sustainable Growth,"* Washington D,C, 1994, p. 41.

In may 1995, the Government decided to eliminate import bans on all food items, and at the same time established a new tariff system in which importers have to pay a tariff rate of 30 percent of the value of products, plus 20 percent surcharges and taxes. Onions, garlic, potatoes, dried legumes, red meat, and animal feed are exempted from tariff and surcharges. The importers of these commodities have to pay only the "additional tax" of 5 percent of their values. On the other hand, fish importers have to pay one percent tariffs plus 15 percent surcharges and taxes.[12]

Jordan has applied to join the World Trade Organization (WTO) lately , and it will be required to lower its weighted average of tariff to 12 percent over a period of ten years

[12] Official Newspaper No. 4042, May 8, 1995.

in annual equal cuts. All its non-tariff restrictions should be converted to tariff-based duties within the same period. Of course, the direct impact of this procedure would be the phasing out of effective protection granted to domestic industries over ten years. However, this will expose these industries to foreign competition, and in turn, will give rise to more efficient allocation of resources. Also there would be a possibility for certain imports to increase substantially depending on the price elasticity of import demand. And since the price elasticity of import demand is below one, tariff cuts and associated reduction in domestic prices of imported goods are likely to lead to a rise in import spending and hence to a further increase in trade deficit.

Subsidies on certain consumer goods, especially foodstuff, will have to be eliminated gradually, and domestic prices would be expected to rise gradually as well.

Prior to 1988 , there were several quantitative restrictions in Jordan . In the process of reforming the trade regime since late 1988, many non- tariff barriers have been phased out. However, until the beginning of 1995 there were three categories of non-tariff barriers. First, there was a complete ban on the importation of five commodities, namely, tomato paste, fresh milk, certain dairy products, mineral water and table salt. Second, the importation of five major categories, namely, fruits and vegetables, certain chemicals, medicines and many foodstuff, and telecommunication equipment was subject to "permission " from the concerned authorities prior to acquiring an import license from the Ministry of Industry and Trade which is required for all imports. At the beginning of November 1995, prior permission was phased out for most of imports to Jordan. Agricultural products imported from countries which signed trade protocols with Jordan still need prior permission. Third, the Government has had a monopoly on the import of nine necessary commodities (sugar, wheat, rice, flour, dried milk, cigarettes, frozen chicken, lentils and olive oil).

2. Export policies

Traders of agricultural products are allowed to export without restrictions. In addition, Jordan has adopted an export promotion scheme since 1989 with the aim of reducing the anti-export bias, increasing manufacturing exports, diversifying economic activity, and attracting more foreign investment. Several export incentives were introduced, the main incentive schemes are:

* Duty Drawback Systems for the rebate of import duties and taxes on inputs used in producing export commodities. This scheme was found to be complex, difficult to administer, uncompetitive by international standards, and is not popular with the manufacturers. It prevents access to those who try to establish themselves in export markets.

* Temporary admission or Duty Exemption of inputs. This scheme excludes spare parts from duty exemption. The main shortcoming of this scheme is that the customs officials must be present at all times during the manufacturing process, causing delays and difficulties in the manufacturing process.

* The Government has recently established Export Credit Guarantee Corporation to improve credit and guarantee procedures for exporters.

* The Government offers pre-shipment rediscounting facility which covers up to 60 percent of the fob value of export orders if the export embodied at least 40 percent of local value added. Also the Government offers post-shipment rediscounting facility to cover up to 80 percent of the value of goods meeting the value added requirements.

* The Jordan Export Development and Commercial Centers Corporation (JEDCO) provides a wide range of services directly to exporters and indirectly through the country's various private sector organizations aiming at export promotion. It also encourages exporters to participate in national, regional and international trade fairs.

D. Agricultural Credit Policy

Considerable effort has been made since 1960 to organize the provision of easy credit to farmers. Institutional credit to farmers was mainly extended by the Agricultural Credit Corporation and in a very limited scale by the Jordan Valley Farmer's Union and Jordan Cooperative Organization. The latter stopped granting agricultural loans since 1993. Most of ACC loans granted to the rainfed areas were medium term loans for land reclamation, fruit tree planting, purchase of farm machinery and drilling of deep wells. On the other hand, loans offered to the farmers in the JRV are medium and short term loans. The medium term loans are offered for fruit tree planting, purchasing of drip irrigation systems, plastic houses and tunnels. The short term loans are offered to finance input purchases.

Commercial banks are reluctant to finance agricultural projects. They offer credit to the companies that import agricultural equipment and, in rare cases, finance some big farmers with high value collateral. Commercial banks credit to the agricultural sector was about 2.5 percent of their total credit balances during the period 1976-1993.

Farmers, also get short term credit from the commission agents, but they are committed to sell their produce to these commission agents.

Credit to agriculture is subsidized in Jordan. First the ACC grant agricultural loans at 7-7.5 percent interest rate as against the commercial interest rate of 12 percent. Second, in several occasions the Government provide concessions to farmers against their obligations towards the ACC. The annual loan recovery rate of the ACC in 1994 was around 65 percent.

In the compliance with the reform process, the Government is aiming to develop the ACC into a fully fledged agricultural savings and credit bank having extensive financial and managerial autonomy and responsibility. The Government is also planning to assist farmers to obtain loans in accordance with Islamic tradition.

E. Agriculture Sector Adjustment Program (ASAP)

The main objectives of the World Bank and IMF supported adjustment program are to redress macroeconomic imbalances, reduce sector distortions and restore economic growth. Since 1989, the Government has adopted a number of policy measures to meet these objectives, including: i) a series of fiscal adjustments to reduce the budget deficit including containment of military expenditure, reduction of consumer subsidies, tariff and tax reforms to enlarge the revenue base and enhance performance; ii) devaluation of the Jordanian Dinar

in 1989 followed by the pursuit of a flexible exchange rate policy to maintain competitiveness; iii) restructuring the regime of tariff and trade policies; iv) deregulation of interest rates; and v) a package of measures to strengthen institutional support for private sector development in trade and industry.

The Structural Adjustment Program (SAP) currently under implementation in Jordan emphasizes on the private sector initiative and role in economic development, poverty reduction, external finance and sustainable as well as efficient use of scarce resources.

Within this framework the Government of Jordan has committed itself to reform and modernize the agriculture sector through the adoption of the Agriculture Sector Adjustment Program supported by the Agriculture Sector Adjustment Loan (ASAL).

The Agriculture Sector Adjustment Program supported by ASAL focusses on the following components:

1- Promoting efficiency in the use of natural resources in order to facilitate the transition to optimal use of water and land resources.

2- Encouraging the liberalization of external trade as well as internal markets, lifting of monopolies and facilitating private investment through a rational incentive structure; and

3- Assuring efficient public investment and service provision where Government has a necessary role, making provisions for the private sector where the latter has a comparative advantage. Developing institutions and implementing institutional changes in research, extension, rural credit and cooperatives.

Policy changes implemented within the framework of SAP have reduced the macro-economic imbalances and produced promising results. The fiscal deficit was reduced during 1991-1992. The current account deficit also steadily improved with export of goods and services showing broad based growth mainly due to the flexible foreign exchange policy which underpinned export competitiveness and helped to bring down domestic inflation from 14.3% in 1990 to 7.2% in 1991 and 3.6% in 1995. With the resettlement of refugees following the Gulf crisis and the increased capital inflows, GDP reached to JD 4.2 billion in 1994 while it was about JD 2.6 billion in 1991.

This growth momentum continued into 1995, but at a slower pace. The strong revenue performance together with continued strict control over expenditures in 1995 led to a decline in the budget deficit to about 2.5 percent of GDP, as compared to 7% in 1992. A large share of the fiscal adjustment was accomplished by reducing subsidies. The lower budget deficit together with a cautious credit policy have contained the growth in net domestic assets of the banking system. Imports remained high at an estimated JD 2.6 billion in 1995 (Table 5). However, there was a surplus of JD 43.6 million in the current account (excluding grants) in 1992, compared to a deficit of JD 212.8 million in 1991. In 1993 the current account deficit constituted about 2.46 percent of the GNP, then it dropped to 1.68 percent in 1994. In 1995 it increased again to constitute about 2.47 percent of the GNP. The inflows of workers savings, grants and loans as well as debt rescheduling have been sufficient to finance

the remaining balance of payments (BOP) gap. Foreign exchange reserves were US$ 2779.9 million or about 9 months of imports at the end of 1995.[13]

TABLE 5. FOREIGN TRADE AND BALANCE OF PAYMENTS DURING 1988-1995 (MILLION JD)

ITEM	1988	1989	1990	1991	1992	1993	1994	1995
DOMESTIC EXPORTS	325	534	612	599	634	691	794	1004.5
RE-EXPORTS	57	104	94	172	196	173	201	236.6
IMPORTS	1023	1230	1726	1711	2214	2454	2363	2590.3
TRADE BALANCE	-641	-592	-1020	-940	-1384	-1590	-1368	-1349.8
SERVICE BALANCE (Accrual Basis)	301	319	326	369	614	879	856	998.0
JORDANIAN WORKERS REMITTANCES	336	336	358	306	573	721	746	885.6

Source: Central Bank of Jordan, *"Annual report - 1995,"* vol, 32.

Regarding the regulatory framework, the Government is required to enhance market competition. Measures include: eliminating the special tax concessions and tariff exemptions for Government investments and institutions; removing special concessions for major public enterprises and imposing budgetary constraints on their operation and investment finance.

The Government is committing itself to maintaining Jordan's international competitiveness and a balance of payments position compatible with the growth and credit worthiness objectives. It has been successful in maintaining a flexible foreign exchange policy stance and at the same time has been moving toward the adoption of indirect monetary control instruments and toward further liberalization of the current and capital accounts. Jordan has applied to join the WTO in order to improve integration with the world economy and realize the benefits of open trade, especially with non-regional markets. In this context, the Government will be required to implement measures to rationalize import and export procedures, investment regulations and to further streamline tariff structures.

F. AGRICULTURAL POLICY CHARTER (APC)

The need for an Agricultural Sector Adjustment Program and related Loan was identified as an effective way to seek market-led modernization of the agriculture sector; to improve the

[13] The Central Bank of Jordan, *"Annual Report - 1995"*, vol 32, PP. 8-9.

efficiency of resource use; and finally to reduce the level of intervention of the Government in commercial activities.

Parallel to this, the Ministry of Agriculture commenced a policy review of the agricultural sector. The review emphasized identifying the sector's development constraints and proposing policy and institutional reforms for ameliorating them.

The findings of the sector review along with the ASAL requirements provided justifications for the Ministry of Agriculture (MOA) to embark on the drafting of an Agricultural Policy Charter (APC). The APC, although prepared under the leadership of the Ministry of Agriculture, is a sector-wide document and cuts across the agricultural sector and its institutions.

The conceptual framework of the Agricultural Policy Charter rests on three pillars: *efficiency*, *sustainability* and *equity*. The Agricultural Policy Charter (APC) defines efficiency as "Developing and making optimal use of the available natural and agricultural resources and applying concepts of economic efficiency and competitive advantages in utilizing these resources".

Sustainability is considered in terms of "managing and conserving the natural resources for agricultural production such that these resources (especially soils and water resources) are saved or even enhanced in terms of quantity and quality, where technically and economically feasible". Also included are ideas about promoting agricultural development without putting undue burdens on the national budget; developing a legal and regulatory framework which provides a favourable investment environment in addition to securing stability and continuity; and assuring food supplies to consumers in adequate quantity and quality.

The *equity* concept is developed in the APC by making reference to "Achieving social and economic equity between agriculture and other economic sectors, but also within the agricultural sector itself". Included in this concept are references to providing equal social and economic opportunities to all participants in the sector especially those engaged in agricultural production and who depend on the land for a significant proportion of their livelihood.

After defining the framework in terms of efficiency, sustainability and equity, the APC goes on to define clear policy objectives. A total of four main objectives are enunciated:

(1) Increased Food Self-reliance;
(2) Stimulating Agricultural Growth;
(3) Promoting Balanced Economic Growth and Equity; and
(4) Improving Resource Management and Conservation.

After laying the overall policy framework, the Agricultural Policy Charter deals with specific actions and reforms to be implemented in the five subsectors which constitute Jordan's agriculture sector.

These are:

- Irrigated Agriculture

- Rainfed Agriculture
- Low Rainfall (Badia) Agriculture
- Livestock Production, and
- Forestry.

Four key ingredients necessary to implement the charter are:

- Reform of the legal and regulatory framework to promote change;
- Strengthening the Statistical Base underlying project and program design, and reform decision making;
- Undertaking Research and Extension to Identify the Scientifically Optimal Economic and Environmentally Sustainable Choices when Modernizing Jordan's Agriculture Sector, and
- Monitoring and Evaluating the Reform Process.

Most of the development needs of the agricultural sector have been identified clearly in the Agricultural Policy Charter, though there remains a need to translate them into prioritized and focused action programs. Jordan needs to modernize its agricultural sector and make it more cost effective, efficient and competitive.

V. THE POLICY ANALYSIS

A. OBJECTIVES OF THE POLICY ANALYSIS

During the last three decades, the Government of Jordan intervened in the agricultural sector to achieve specific objectives. The intervention took place in two ways: first through direct intervention such as the retail price policy, water and credit subsidies, and second indirect intervention through control over the exchange rate. The Government aimed at improving the distribution and stability levels of farmer's real income, increasing national production of food commodities, and improving the efficiency of resource allocation.

In a free economy, price mechanism and markets play significant role in resource allocation and production. Nonetheless, public sector plays an important role in strengthening markets by: 1) providing the necessary infrastructure such as roads, irrigation systems and market places; 2) providing marketing information, research and extension; 3) enforcing macroeconomic policies that avoid high rate of inflation and overvaluation of the exchange rate; and 4) creating suitable environment for competition.

The purpose of this study was to determine the impact of public policies such as input-output prices, factor prices, credit subsidies, and exchange rate on the efficiency of selected crops produced in the Jordan Rift Valley and the Highlands. The crops selected in the Jordan Rift Valley (JRV) included tomatoes, cucumbers, squash, eggplants, potatoes, onions, cantaloupes, and watermelon. Major fruit crops in the JRV, such as citrus, bananas, and grapes were also considered. For the Highlands, the selected vegetables and fruits included tomatoes, potatoes, watermelon, olives, and grapes. Field crops such as wheat and barley grown in the Highlands were also studied.

Crop budgets prepared by ESCWA[14] and OIAD[15] were used to build several accounting matrices known as Policy Analysis Matrix (PAM). These matrices were designed to assist in understanding the interactions of many policies that influence agricultural incentives and help illuminate the tradeoffs (if any) between policy objectives[16]. In order to be able to compare the return of perenials crops (Tree crops) with annual crops, the costs and returns stream of cash flow for the formal were first discounted to find their present value and then annualized. The rate of discount is of major importance in determining the present value of a stream of future benefits and cost from an investment venture. Discount rates of 7 percent and 12 percent were used for the calculation of the present values in private budgets and social budgets respectively.

---

[14] United Nations Economic and Social Commission for Western Asia, "National Farm Data Handbook-Jordan", (Amman, 1993).

[15] Office for Integrated Agricultural Development (OIAD), "Study on the Future Adjustment of Agricultural Production Systems in the Jordan Rift Valley", 1995, Amman, Jordan.

[16] Eric A. Monke and Scott R. Pearson, The Policy Analysis Matrix for Agricultural Development, Cornell University Press (Ithaca, New York, U.S.A.,1989), p. 18-19.

B. The Policy Analysis Matrix (PAM)

1. Empirical model

Economic profit is the fundamental part of the Policy Analysis Matrix (PAM) approach. Profit is defined as the difference between the value of outputs (revenues) and the costs of all inputs (costs).

Table 6. The Policy Analysis Matrix

Item	Revenues	Costs of		Profits
		Tradable Inputs	Domestic Factors	
Private Prices	A	B	C	D
Social Prices	E	F	G	H
Effects of Policy and other Divergences	I	J	K	L

The symbols (capital letters) are defined as follows:

A Revenues in private prices (market prevailing prices, also called financial prices).
B Costs of tradable inputs (such as fertilizers, seeds, plastic mulch, etc.) in private prices.
C Costs of domestic factors (such as labor, capital, etc.) in private prices.
D Private profit.
E Revenues in social prices, also called economic or efficiency prices.
F Costs of tradable inputs (such as fertilizers, seeds, plastic mulch, etc.) in social prices.
G Costs of domestic factors such as (labor, capital, etc.) in social prices.
H Social profit.
** Private Profits (D) D=A-B-C
** Social Profits (H) H=E-F-G
** Output Transfers (I) I=A-E
** Input Transfers (J) J=B-F
** Factor Transfers (K) K=C-G
** Net Transfers (L) L=D-H or L=I-J-K

The PAM model is portrayed in Table 6. Private profits are defined in the first row as D=A-B-C. The letter A is used to define the private revenues (the revenues at the prevailing market prices). Costs are divided into two components. Costs of tradable inputs

(inputs which are traded in the world markets) such as fertilizers, pesticides, and seeds are included in the second column.

The value of tradable inputs at the prevailing market prices (private prices) are recorded in the first row, second column and denoted by the letter B. Tradable inputs can be imported from or exported to other countries.

The third column of the matrix includes domestic factors. Costs of domestic factor in private prices are denoted by the letter C. Domestic factors include land, water, labor, and capital. Domestic factors are also called non-tradable inputs because there is no international market for these inputs.

Column four in the matrix is labeled as profits. Private profits, denoted as D in the matrix, are included in the first row of the fourth column. Profits are defined as revenues minus costs. Positive profits at prevailing market prices confirm the profitability of the business. Positive profits also provide stimulus for existing firms to increase output and expand the business. Expansion of existing firms as well as entry of new firms in the market stimulate economic growth. When the market prices of inputs or outputs are distorted by either taxes or subsidies, then private profits alone could provide misleading signals.

The second row of the PAM is used to calculate social profits, H=(E-F-G). Social profits are those profits calculated at efficiency prices. The letter E portrays the revenues valued at efficiency prices (social prices) and F and G indicate the efficiency values of tradable inputs and domestic factors, respectively. Positive social profits (H) indicate incentive for expansion of the activities under consideration and result in apparent growth of national income.

The third row of the matrix shows the divergences or differences between the first row (private valuation) and second row (social valuation). If market failure does not exist, then all divergences between private and social prices of tradable outputs and inputs are caused by distorting policies.

Policies which may cause divergences include subsidies, taxes and quantitative controls applied to domestic production or trade of the commodity. Price policies may also cause distortions.

In the third row, if the value of I, defined as output transfer, is positive then private revenues exceed social revenues. This indicates that the Government is subsidizing output prices. That is, the Government is purchasing production in prices greater than international market prices. The value of the difference is a transfer from the treasury to the producers of that commodity.

If the value of I is negative, then social revenues are greater than the private revenues. This means that the Government is taxing producers. In other words, the Government is

purchasing production in prices lower than those prevailing in international markets. The tax in this case is a transfer from producers to the treasury.

The letter J represents the differences between the private costs and social costs of tradable inputs. If J is negative, the private costs of tradable inputs is lower than the social costs. This means that the Government is subsidizing the costs of inputs as these inputs are sold at prices lower than those prevailing in the international markets.

On the other hand, if J is positive, then private cost of inputs are greater than the social costs. This indicates that the Government is taxing the price of inputs used by farmers. The net effect is that prices paid by farmers are greater than the world market prices.

The letter K portrays the divergences in domestic factors. The Government can affect the prices of domestic factors such as capital or land. When any factor of production is subsidized, the private cost of a domestic factor will be less than the social costs and K will have a negative value. But, if the Government taxes domestic factors, which rarely is the case in developing countries, K will have a positive value.

Taxes and subsidies are commodity-specific policies. They directly affect the prices of outputs or inputs. Governments may use indirect policies such as the manipulation of the exchange rate of the country's currency to affect commodity prices. Since in PAM accounting is done in domestic currency and world prices are reported in international currencies, hence an exchange rate is required to express international prices in their domestic equivalents.

The effect of exchange rate manipulation depends upon whether the policy results in over or undervaluation. An overvalued exchange rate occurs if there is an excess demand for foreign currencies which results in extra foreign borrowing, excessive drawing down of exchange reserves, or rationing of foreign exchange among domestic users. "An undervalued exchange rate reflects an excess supply of foreign exchange that is accumulating as excessive reserves and reducing potential income"[17].

An overvalued exchange rate inflicts an implicit tax on producers of tradable exportable goods. Overvaluation reduces the competitiveness of the local producers in international markets because they are practically being taxed. Undervalued exchange rate exerts the opposite effects.

The social exchange rate may differ from the official exchange rate. In the PAM approach, this distortion in the exchange rate is actually corrected once border prices are converted to domestic prices at the social exchange rate rather than at the official rate.

---

[17] Eric A. Monke and Scott R. Pearson, The Policy Analysis Matrix for Agricultural Development, Cornell University Press (Ithaca, New York, U.S.A., 1989), p. 24.

The letter L denotes the net effect of all policies on the commodity system. If the overall effect of all policies on input and output prices is in favor of the producers (in the short run), L will have a positive value. Alternatively, L will have a negative value, if the policies work to the detriment of the producers.

2. Measures of protection

Standard ratios reflecting the degree of price distortions are normally calculated to compare profitability and efficiency of different crops. These ratios facilitate comparisons among activities, particularly when the production process and outputs are dissimilar. The ratios can also be used to rank alternatives according to different policy objectives. A number of protection coefficients could be calculated in a standard PAM. The most commonly used protection coefficients are Nominal Protection Coefficients (NPC) and Effective Protection Coefficient (EPC).

The NPC is calculated by dividing the revenue in private prices (A) by the revenue in social prices (E). The objective of calculating NPC is to measure the actual divergences or distortions between domestic prices and international or border prices of output[18]. If NPC is less than one it confirms the presence of taxes on outputs. An NPC greater than one shows the presence of subsidies. An NPC equal to one (in the absence of market failures) reveals the absence of intervention, a property desired by most international donor agencies.

The EPC is defined as the ratio of value added in private prices (A-B) to value added in social prices (E-F). It is another measure of incentives to farmers[19]. This coefficient indicates the combined effects of policies on tradable commodities (inputs and outputs). The EPC is a useful indicator that measures the whole structure of incentives/dis-incentives which may exist with respect to a given production process. An EPC less than one indicates negative effects of policy (a tax), whereas an EPC greater than one indicates positive effects of policy (a subsidy).

The Profitability Coefficient (PC) measures the incentive effects of all policies affecting the production of the selected products. However, its use is limited when either private or social profits are negative. The PC can be used as a proxy for the net policy transfer (L).

The Private Cost Ratio (PCR), explains the ratio of domestic factor costs (C) to value added in private prices (A-B). This ratio demonstrates the ability of the production system to cover the cost of the domestic factors and continue to be competitive. This ratio is

---

[18] Food and Agriculture Organization of the United Nations, "Comparative Advantage of Agricultural Production Systems and its Policy Implications in Pakistan", FAO Economic and Social Development Paper (68), (Rome, 1987), p. 2.

[19] R. Naylor and C. Gotsch, "Agricultural Policy Analysis Course-Computer Exercises", Food Research Institute, Stanford University, Palo Alto, CA,USA (July 1989).

important for investors because they can maximize their profits by minimizing the cost of tradable inputs and factors.

3. Measures of comparative advantage

Comparative advantage could be measured by the Domestic Resource Cost (DRC) ratio. DRC determines whether the production of a specific crop makes efficient use of the domestic resources. The same set of data used to estimate the protection coefficients could also be utilized to estimate the comparative advantage of a specific crop in a particular region.

The DRC, as a measure of efficiency or comparative advantage, is calculated by dividing the factor cost in social prices (G) by the value added in social prices (E-F)[20]. A DRC greater than one indicates that the cost of domestic resources used to produce the commodity is greater than the contribution of its value added at social prices meaning a comparative disadvantage. A DRC less than one indicates that the country has a comparative advantage in producing that commodity, or that the commodity is making efficient use of the domestic resources.

4. Modeling assumptions

(a) Selection of commodity systems

Major cereals, vegetables and fruit trees produced in the Jordan Rift Valley and the Highlands were selected for the policy analysis. The Jordan Rift Valley is divided into four agro-climatical zones: 1)zone 1, representing the nothern part of the Jordan Rift Valley; 2)zone 2, representing the central part of the Valley; 3) zone 3, representing the southern part of the Valley; and zone 4, representing the Safi Ghors and Wadi Araba. The main objective of conducting the Policy Analysis Matrix (PAM) for these crops in the four agro-climatical zones of the Jordan Rift Valley and in the Highlands was to estimate policy incentives, profitabilities and efficiencies. Tomatoes, cucumbers, squash, eggplants, bananas, and citrus are the major irrigated crops produced in the Jordan Rift Valley. Wheat and barley are the principal field crops produced in the rainfed region of the Highlands. Olives are the most important fruit produced in the Highlands.

(b) Social valuation of tradables and non-tradables

Social valuation of outputs and inputs is a major segment in the building process of the Policy Analysis Matrix (PAM). Social prices in the PAM are also referred to as efficiency prices. Social or efficiency prices demonstrate the opportunity costs of consumption. World prices of inputs and outputs are the cornerstone for estimating the efficiency prices.

---

[20] R. Naylor and C. Gotsch, "Agricultural Policy Analysis Course-Computer Exercises", Food Research Institute, Stanford University, Palo Alto, CA, USA (July 1989).

TABLE 7. SOCIAL VALUATION OF IMPORTED TRADABLE INPUTS*, 1994

Item	NITROGEN	PHOSPHATE	POTASH
CIF Aqaba Gulf (US$/Ton)	520.00	1688.00	1900.00
Equilibrium Exchange Rate (JD/US$)	0.80	0.80	0.80
CIF Aqaba Gulf (JD/Ton)	413.92	1343.65	1512.40
Handling Charges (JD/Ton)	0.63	0.63	0.63
Clearance Fees (JD/Ton)	0.17	0.17	0.17
General Fees (JD/Ton)	1.80	1.80	1.80
Losses 0.5% of Total Costs	2.08	6.73	7.57
Distance Between Port and Warehouse (km)	350.0	350.0	350.0
Transport Rate Between Warehouse to Port (JD/km)	0.03	0.03	0.03
Transportation Cost Between Port and Warehouse (JD/Ton)	9.5	9.5	9.5
Import Parity Price at Wholesaler Warehouse (JD/Ton)	428.1	1362.5	1532.1
Transport Cost From Warehouse to Farm (JD/Ton)	6.25	6.25	6.25
Import Parity Price at Farm Gate (JD/Ton)	434.4	1368.8	1538.4
Import Parity Price at Farm Gate (JD/kg)	0.43	1.37	1.54

* Figures in the tables are rounded.

The social prices were calculated by adjusting the international market prices for exchange rate, insurance, handling, losses, domestic marketing and transport costs to the farm level. Different assumptions were used for adjusting the prices of different inputs and outputs.

To perform the social valuation, the tradable products were first identified. The products were then classified into exportable and importable categories. Importables are imported or locally produced import substitutes. Exportables are local products that could be exported. Exportables in this study include almost all vegetables produced in the Jordan Rift Valley (JRV) except potatoes and onions. Production of potatoes and onions is not sufficient to satisfy the domestic needs. Other importables include seeds, machinery, chemicals, nitrogen, phosphorus, and potash. Non-tradables include land, water, domestic transportation, fixed capital, and labor.

(c) Equilibrium exchange rate

Equilibrium Exchange Rate (EER) is an essential component in calculating the efficiency prices of tradable (exportable and importable) goods. The equilibrium exchange rate may be estimated by several methods such as the elasticity approach, the common approach, and the Standard Conversion Factor approach. The elasticity approach[21] requires the availability of data on both quantities demanded and supplied of foreign exchange, the nominal exchange rate, as well as, the supply and demand elasticities. The common approach uses data on total values of exports and imports in foreign prices, converted into domestic values at the official exchange rate plus a premium to adjust the official exchange rate[22].

In this study, the Standard Conversion Factor (SCF) Approach [23] was used to adjust for distortions introduced by trade regime between the border prices of traded goods and the domestic shadow prices of non-traded goods. According to this approach, the equilibrium exchange rate for Jordan was estimated as follows: 1) the Standard Conversion Factor (SCF) was first calculated by dividing the total value of exports and imports over the total value of exports and imports plus taxes and duties on imports and exports as shown in Equation 1 ; 2) and then the equilibrium exchange rate was obtained by dividing the official exchange rate (0.696 JD/US$) over the SCF (0.87). The equilibrium exchange rate derived according to the above procedure was 0.796 JD/US$ for the Jordanian currency.

---

[21] IBRD, World Bank Comparative Studies, The Political Economy of Agricultural Pricing Policy, "Trade, Exchange Rate, and Agricultural Pricing Policies in Pakistan", (Washington, D.C., USA). 1990.

[22] Isabelle Tsakok, Agricultural Price Policy - A Practitioner's Guide to Partial-Equilibrium Analysis, Cornell Press, Ithaca, NY, USA, 1990, p. 42.

[23] Isabelle Tsakok, Agricultural Price Policy - A Practitioner's Guide to Partial-Equilibrium Analysis, Cornell Press,Ithaca, NY, USA, 1990, p. 42.

TABLE 8. SOCIAL VALUATION OF IMPORTED TRADABLE OUTPUTS IN THE HIGHLANDS, 1994

Item	WHEAT	BARLEY	POTATOES
CIF Aqaba Gulf (US$/Ton)	151.86	107.14	225.00
Equilibrium Exchange Rate (JD/US$)	0.80	0.80	0.80
CIF Aqaba Gulf (JD/Ton)	120.88	85.29	179.10
Handling Charges (JD/Ton)	0.63	0.63	0.63
Clearance Fees (JD/Ton)	0.17	0.17	0.17
General Fees (JD/Ton)	1.80	1.80	1.80
Losses 0.5% of Total Costs	0.62	0.44	0.91
Distance Between Port and Warehouse (km)	350.0	350.0	350.0
Transport Rate Between Warehouse to Port (JD/km)	0.03	0.03	0.03
Transportation Cost Between Port and Warehouse (JD/Ton)	9.5	9.5	10.5
Import Parity Price at Wholesaler Warehouse (JD/Ton)	133.6	97.8	193.1
Transport Cost From Warehouse to Farm (JD/Ton)	6.26	6.25	6.25
Import Parity Price at Farm Gate (JD/Ton)	127.4	91.6	186.9
Import Parity Price at Farm Gate (JD/kg)	0.13	0.10	0.19

TABLE 9. SOCIAL VALUATION OF IMPORTED TRADABLE OUTPUTS IN THE JORDAN RIFT VALLEY, 1994

Item	POTATOES	ONIONS	BANANAS
CIF Aqaba Gulf (US$/Ton)	225.00	211.00	672.00
Equilibrium Exchange Rate (JD/US$)	0.80	0.80	0.80
CIF Aqaba Gulf (JD/Ton)	179.10	167.96	534.91
Handling Charges (JD/Ton)	0.63	0.63	0.63
Clearance Fees (JD/Ton)	0.17	0.17	0.17
General Fees (JD/Ton)	1.80	1.80	1.80
Losses 0.5% of Total Costs	0.91	0.85	2.69
Distance Between Port and Warehouse (km)	350.0	350.0	350.0
Transport Rate Between Warehouse to Port (JD/km)	0.03	0.03	0.11
Transportation Cost (JD/Ton)	10.5	10.5	39.0
Import Parity Price at Wholesaler Warehouse (JD/Ton)	193.1	181.9	579.2
Transport Cost From Warehouse to Farm (JD/Ton)	6.25	6.25	6.25
Import Parity Price at Farm Gate (JD/Ton)	186.9	175.7	572.9
Import parity price at Farm Gate (JD/kg)	0.19	0.18	0.57

EQUATION 1: EQUILIBRIUM EXCHANGE RATE (EER) CALCULATION

$$SCF = \frac{EXPORTS + IMPORTS}{EXPORTS + IMPORTS + TAXES + DUTIES}$$

$$EER = \frac{1}{SCF} * OER$$

Where:

EER = Equilibrium Exchange Rate;
SCF = Standard Conversion Factor; and
OER = Official Exchange Rate.

(d) Social prices of tradables

Social prices of importable inputs such as nitrogen, phosphorus, and potash, and that of importable outputs such as wheat, barley, onions, and potatoes, were estimated by using import parity prices for importable commodities as shown in Table 7, 8 and 9. Social prices for exportable commodities such as tomatoes, cucumbers, eggplants, and squash were calculated by using export parity prices as shown in Table 10 and 11. As mentioned earlier, all vegetable crops produced in the JRV are exportables, except potatoes and onions. A three-year weighted average c.i.f prices for importables at the Aqaba port were used[24]. The f.o.b prices were used for exportables.

The observed port of entry c.i.f prices were converted by the equilibrium exchange rate (Jordanian Dinar 0.796 against the US Dollar). The import parity prices were estimated as per Equation 2.

[24] Government of Jordan, Department of Statistics (DOS), External Trade Books, for the years 1992, 1993, and 1994.

TABLE 10. SOCIAL VALUATION OF EXPORTED TRADABLE OUTPUTS IN THE HIGHLANDS, 1994

Item	TOMATOES	WATERMELON	OLIVES	GRAPES
FOB at Saudi Arabia Border (US$/Ton)	244.93	221.43	761.43	584.26
Equilibrium Exchange Rate (JD/US$)	0.80	0.80	0.80	0.80
Unadjusted Price of Produce (JD/Ton)	194.96	176.26	606.10	465.07
Handling and Clearance Charges (JD/Ton)	10.00	10.00	10.00	10.00
Distance Between Border and Exporter Packaging Center (km)	350.00	350.00	350.00	350.00
Transportation Rate (JD/km/Ton)	0.11	0.03	0.03	0.03
Transportation Cost From Packaging Center to Border (JD/Ton)	39.00	39.00	39.00	39.00
Unadjusted Price of Produce at Exporter Packaging Center (JD/Ton)	145.96	127.26	557.10	416.07
Marketing Costs (JD/Ton):	17.33	16.96	25.55	22.73
-2% of Cost of Produce for Amman Municipality	2.92	2.55	11.14	8.32
- 75JD Per Truck, Certificate of Origin (Truck Load 17 Tons)	4.41	4.41	4.41	4.41
-Transport From Wholesale Market to Packaging Center	1.00	1.00	1.00	1.00
-Post Harvest Labor	5.00	5.00	5.00	5.00
-Post Harvest Materials	4.00	4.00	4.00	4.00
Unadjusted Price of Produce at Amman Wholesale Market (JD/Ton)	128.63	110.30	531.54	393.34
Transport Cost From Farm to Amman Wholesale Market (JD/Ton)	6.25	6.25	6.25	6.25
Export Parity Price at Farm Gate (JD/kg)	0.12	0.10	0.53	0.39

EQUATION 2. IMPORT PARITY PRICE

$$IPP = OPP_{cif} * EER + HCP + TCBM + MC - TCFM - TPC$$

Where:

IPP = Import Parity Price;
OPP_{cif} = Observed Port of Entry Price;
EER = Equilibrium Exchange Rate (JD/US$);
HCP = Handling Costs at Port of Entry;
TCBM = Transport Cost from Border to Market;.
MC = Marketing Costs;
TCFM = Transport Costs from Farm to Market, and
TPC = Total Processing Cost at the Factory.

The observed port of entry f.o.b prices were converted by the equilibrium exchange rate of the Jordanian Dinar against the US Dollar. The export parity prices were estimated as per Equation 3.

EQUATION 3. EXPORT PARITY PRICE

$$EPP = OPP_{fob} * EER - HCP - TCBM - MC - TPC - TCFM$$

Where:

EPP = Export Parity Price;
OPP_{fob} = Observed Port of Entry Price;
EER = Equilibrium Exchange Rate (JD/US$);
HCP = Handling Costs at Port of Entry;
TCBM = Transport Cost from Border to Market;.
MC = Marketing Costs;
TPC = Total Processing Cost at the Factory, and
TCFM = Transport Costs from Farm to Market.

TABLE 11. SOCIAL VALUATION OF EXPORTED TRADABLE OUTPUTS IN THE JORDAN RIFT VALLEY, 1994

Item	TOMATOES	CUCUMBERS I	PEPPERS	CANTALOUPE	WATERMELON
FOB at Saudi Arabia Border (US$/Ton)	464.89	457.36	536.33	455.49	416.00
Equilibrium Exchange Rate (JD/US$)	0.80	0.80	0.80	0.80	0.80
Unadjusted Price of Produce (JD/Ton)	370.05	364.06	426.92	362.57	331.14
Handling and Clearance Charges (JD/Ton)	10.00	10.00	10.00	10.00	10.00
Distance Between Border and Exporter Packaging Center (km)	350.00	350.00	350.00	350.00	350.00
Transportation Rate (JD/km/Ton)	0.11	0.11	0.11	0.11	0.11
Transportation Cost From Packaging Center to Border (JD/Ton)	38.50	38.50	38.50	38.50	38.50
Unadjusted Price of Produce at Exporter Packaging Center (JD/Ton)	321.55	315.56	378.42	314.07	282.64
Marketing Costs (JD/Ton):	20.84	20.72	21.98	20.69	20.06
-2% of Cost of Produce for Amman Municipality	6.43	6.31	7.57	6.28	5.65
- 75JD per Truck, Certificate of Origin (Truck Load 17 Tons)	4.41	4.41	4.41	4.41	4.41
-Transport From Wholesale Market to Packaging Center	1.00	1.00	1.00	1.00	1.00
-Post Harvest Labor	5.00	5.00	5.00	5.00	5.00
-Post Harvest Materials	4.00	4.00	4.00	4.00	4.00
Unadjusted Price of Produce at Amman Wholesale Market (JD/Ton)	300.71	294.83	356.44	293.37	262.57
Transport Cost From Farm to Amman Wholesale Market (JD/Ton)	6.25	6.25	6.25	6.25	6.25
Adjusted Farm Gate Price of the Produce (JD/kg)	.29	.29	.35	.29	.26

TABLE 11. (CONTINUED)

Item	SQUASH	GREENBEANS	EGGPLANTS	ORANGES	GRAPES
FOB at Saudi Arabia Border (US$/Ton)	514.70	962.14	353.96	511.89	639.73
Equilibrium Exchange Rate (JD/US$)	0.80	0.80	0.80	0.80	0.80
Unadjusted Price of Produce (JD/Ton)	409.70	765.87	281.75	407.46	509.22
Handling and Clearance Charges (JD/Ton)	10.00	10.00	10.00	10.00	10.00
Distance Between Border and Exporter Packaging Center (km)	350.00	350.00	350.00	350.00	350.00
Transportation Rate (JD/km/Ton)	0.11	0.11	0.11	0.11	0.11
Transportation Cost From Packaging Center to Border (JD/Ton)	38.50	38.50	38.50	38.50	38.50
Unadjusted Price of Produce at Exporter Packaging Center (JD/Ton)	361.20	717.37	233.25	358.96	460.72
Marketing Costs (JD/Ton):	21.64	28.76	19.08	21.59	23.63
-2% of Cost of Produce for Amman Municipality	7.22	14.35	4.66	7.18	9.21
- 75JD Per Truck, Certificate of Origin (Truck Load 17 Tons)	4.41	4.41	4.41	4.41	4.41
-Transport From Wholesale Market to Packaging Center	1.00	1.00	1.00	1.00	1.00
-Post Harvest Labor	5.00	5.00	5.00	5.00	5.00
-Post Harvest Materials	4.00	4.00	4.00	4.00	4.00
Unadjusted Price of Produce at Amman Wholesale Market (JD/Ton)	339.57	688.61	214.17	337.37	437.10
Transport Cost From Farm to Amman Wholesale Market (JD/Ton)	6.25	6.25	6.25	6.25	6.25
Adjusted Farm Gate Price of the Produce (JD/kg)	.33	.68	.21	.33	.43

For seeds, machinery and chemicals, information on import fees, handling, and exchange rates (obtained from the import licensing schedules) was used to change prices from private to social values. Both tariffs and the distortions in the exchange rate were deducted from the observed private prices in order to arrive at estimates of the social prices for seeds and chemicals.

(e) Social prices of non-tradables

The term "non-tradable inputs" refer to domestic factors not traded internationally, meaning that there are no international prices for these factors. The social prices of domestic factors such as land, water, capital, and labour, are determined in the domestic economy of the country.

To estimate the social prices of these resources, various approaches may be used. One approach is to use the outputs of a general equilibrium model, as estimates for the social prices of domestic factors. However, a general equilibrium model was not available for Jordan. In what follows, alternative approaches were used to estimate the social prices of each factor.

i. Capital

The Agricultural Credit Corporation (ACC) is one of the major sources of finance for agricultural inputs. The ACC which is a formal capital source, provides farmers with the needed credit at the beginning of each production season. It charges a subsidized interest rate amounting on average to 7.0%, while commercial banks charges interest of 12.0%. This subsidy of 5.0% (the difference of the interest rates) was added to the interest cost component of the private cost of production in order to arrive at its social cost.

ii. Labour

Labour market is relatively free in Jordan although insignificant wage differences exist between different agro-climatical zones. The prevailing market wages were used without any adjustment to derive the social wages of labour.

iii. Land

One of the most difficult tasks in building a PAM is determining the social price of land. Land values normally differ from one location to another based on the uses of land (such as industrial, commercial, and housing). Agricultural land rent also differs mainly on the basis of the availability of irrigation water, the soil type, precipitation, size, and location.

The private (financial) prices used in the private budgets were those prices reported by the farmers as reflecting the prevailing market prices of one dunum of land. Different rents

for land were calculated from the records of the Jordan Valley Authority (JVA) for four zones. The highest rent was found to be at zone 1, 46 JD/dunum followed by zone 4, 41 JD/dunum; then zone 2, 32 JD/dunum, and zone 3, 23 JD/dunum.

It was assumed that competitive markets for agricultural land exist in the Jordan Rift Valley, as well as in the Highlands. The variation in land rents from one zone to another reflects on the opportunity costs of these lands. In other words, the private rents of land reported in the JVA records were used as proxy for social rents.

iv. Water

Government projects are the major source of water in the Jordan Rift Valley. Few large farms own their tubewells in the Southern JRV. The Government used to charge farmers 6 fils per cubic meter of water (1000 fils = 1 dinar). Starting in 1995, it implemented a progressive pricing system for water supplied by the JVA. The price starts at 8 fils per cubic meter for the first 1000 CM, then it goes up to 12 fils for the second 1000 CM, and so on until it reaches 35 fils per cubic meter.

Several social prices for irrigation water in the Jordan Rift Valley were suggested by different studies. However, a social price for water in the Jordan Rift Valley was estimated at 60 fils per cubic meter. This price was estimated to reflect the maintenance and operational costs plus depreciation and investment costs. However, the long-term marginal cost of water in the Jordan Rift Valley has been estimated at 230 fils per cubic meter.

Privately owned tubwells are the major source of irrigation water in the Highlands. A price of 350 fils per cubic meter for vegetables was used in the analysis. This price represents the average selling price of one cubic meter of water in the Highlands[25]. Since there is a water market in the Highlands, the same price of 350 fils per cubic meter was used for social valuation.

[25] Agricultural Credit Corporation, Handbook of Agricultural Costs", (Amman, Jordan). 1994.

VI. RESULTS

Tables 12 through 16 contain summary results of the policy analysis for major crops grown in the Highlands and in the four agro-climatical zones of the Jordan Rift Valley (JRV). The results are reported on a per durum basis and cover the production cycle for the year 1994. Detailed private and social budgets along with the policy analysis matrices for each crop by agro-climatical zones are presented in Annexes B and C. The results of analysis for the Highlands and the four agro-climatical zones of the Jordan Rift Valley are discussed separately below.

A. Results of Analysis in the Highlands

1. Cereals

Wheat and barley are the dominant cereals produced in the Highlands under rainfed conditions. Lentils and chickpeas are also grown under the same conditions but on a limited scale. In 1994, the total area cultivated with wheat and barley amounted to 1.31 million dunums, forming 91 percent of the total area cultivated with field crops in Jordan.[26] Irrigated wheat has occupied an area of 27 thousand dunums in both the southern desert part of the Highlands and the Jordan Rift Valley.

Summary results on indicators of competitiveness, efficiency and policy impacts of major crops grown in the Highlands are presented in Table 12. The irrigated wheat grown in the Highlands has generated a positive private profit of JD 19.97 per dunum. This private profitability reflects positively on the competitiveness of the irrigated wheat system, given current technology, input costs, output values, and policy impacts (transfers). The private profitability in wheat enterprise has been achieved by remunerative output prices along with cheap input prices, encouraged by government policies in order to expand wheat production in the country.

The social profitability, which measures comparative advantage or efficiency in the commodity system, on the other hand, for irrigated wheat depicts a different picture. The social profit for the irrigated wheat is actually negative. This reflects the situation in the absence of policy intervention. In other words, the irrigated wheat incurs a loss of JD 279.79 per dunum, valued at social (economic) prices which reflects on scarcity values or social opportunity costs. From the point of efficiency and cost to the economy, the irrigated wheat system with negative social profit is a drain on the economy. The picture becomes clearer once the transfers (divergence) and related coefficients of incentives and efficiency such as nominal protection coefficients (NPCs), effective protection coefficients (EPCs) and the domestic resource costs ratios (DRCs) are reviewed.

Review of divergence or transfers, which shed light on the incentive structure, confirms that the irrigated wheat is highly protected and receives both explicit and implicit subsidies on prices of output, tradable inputs, and most factors of production.

---

[26]Ministry of Agriculture, the Annual Report, Amman, 1994, p. 43.

TABLE 12. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE HIGHLANDS

ITEMS	IRRIGATED WHEAT	RAINFED WHEAT	RAINFED BARLEY	TOMATOES	POTATOES	WATERMELON	IRRIGATED OLIVES	RAINFED OLIVES	IRRIGATED GRAPES	RAINFED GRAPES
PRIVATE PROFIT	19.97	3.42	1.21	234.66	228.97	-49.94	56.26	18.44	717.97	47.82
SOCIAL PROFIT	-279.79	-2.25	-0.76	194.34	-74.10	19.33	-50.39	13.58	525.06	48.74
PVA(A-B)	59.88	13.93	11.72	557.15	556.81	129.18	140.97	51.51	832.71	92.90
SVA(E-F)	41.65	8.75	10.24	529.67	266.38	206.82	119.88	45.52	833.34	93.48
OUTPUT TRANSFER	5.37	1.72	0.26	13.25	266.58	-85.22	18.00	4.86	-12.16	-2.46
INPUT TRANSFER	-12.87	-3.46	-1.22	-14.23	-23.85	-7.57	-3.09	-1.14	-11.53	-1.89
FACTOR TRANSFER	-281.53	-0.49	-0.49	-12.83	-12.63	-8.37	-85.57	1.13	-193.54	0.35
NET TRANSFER	299.76	5.67	1.97	40.31	303.07	-69.27	106.66	4.86	192.91	-0.92
PCR (C/A-B)	0.67	0.75	0.90	0.58	0.59	1.39	0.60	0.64	0.14	0.49
DRC(G/E-F)	7.72	1.26	1.07	0.63	1.28	0.91	1.42	0.70	0.37	0.48
NPCo(A/E)	1.07	1.08	1.01	1.02	1.60	0.64	1.12	1.09	0.99	0.98
NPCi (B/F)	0.64	0.70	0.86	0.84	0.87	0.77	0.89	0.90	0.79	0.91
PC (D/H)	-0.07	-1.52	-1.59	1.21	-3.09	-2.58	-1.12	1.36	1.37	0.98
EPC{(A-B)/(E-F)}	1.44	1.59	1.14	1.05	2.09	0.62	1.18	1.13	1.00	0.99
MTD{(D-H)/(E-F)}	7.20	0.65	0.19	0.08	1.14	-0.33	0.89	-0.11	0.23	-0.01

The NPC is a ratio that contrast the observed (private) commodity price with a comparable border (social) price. This ratio indicates the impact of policy (and any market failure not corrected by efficient policy) that causes a divergence between the two prices. The NPC calculated on output prices of irrigated wheat denoted as NPC0 in Table 12 confirms that procurement prices of wheat are 7 per cent higher than comparable border prices. The NPC on tradable inputs denoted as NPCI shows that the domestic input prices, on average, are 36 per cent lower than comparable border prices. The combined effects of incentives/ disincentives on input and output prices could be measured by EPC, which is the ratio of value added in private prices to value added in social prices. The EPC of 1.44 in the case of irrigated wheat confirms 44 per cent positive protection. In addition to that, the irrigated wheat system also receives sizable subsidies on most factors of production, particularly credit, water, and land.

The ability of an agricultural system to compete without distorting Government policies can be strengthened or eroded by changes in economic conditions. The protection coefficients such as NPCs and EPCs are considered measures of relative incentives, which have implications for efficiency. Coefficients of comparative advantage (DRCs), on the other hand, are measures of relative efficiency, which have implication for incentives. The information content of coefficients of protection and coefficients of comparative advantage is complementary because policy-making combines consideration of both. Efficient domestic production of tradable goods-- for export and import substitution-- is an important policy consideration for planning and investment purposes. An economy has a comparative advantage in the production of a tradable commodity if that production is efficient; if not , it has a comparative disadvantage. In order to assess the comparative advantage, the concept of opportunity cost was employed and the DRCs for the prevailing commodity systems were calculated.

In the case of irrigated wheat, the DRC is significantly larger than 1, indicating that Jordan does not have a comparative advantage in wheat production under irrigation in the Highlands. As such, the current policy environment is providing excessive incentives to the production of an efficient crop system. These incentives could better be provided to those crops in which Jordan has a clear-cut comparative advantage.

Likewise, wheat and barley grown under rainfed conditions are also supported with positive incentives. Both rainfed wheat and barley have generated private profits of JD 3.42 and 1.21 per dunum. These profits are much lower than the one generated by irrigated wheat, mainly to a large extent due to significant differences in productivity (yields). Similarly, the social profits for both rainfed wheat and barley are negative. In the absence of Government policies the production of these crops is not sustainable.

The NPCs for rainfed wheat and barley confirm that domestic prices of these crops are higher than the border prices, implying a net subsidy on producers prices. On the input side, also producers of rainfed wheat and barley receive subsidies. They pay only 70 per cent and 86 percent of the border prices of tradable inputs.

The EPCs of rainfed wheat and barley, measuring the combined effects of intervention on input and output prices, are pointing to the level of positive protection to the order of 59 per cent and 14 per cent respectively.

The DRCs for rainfed wheat and barley are greater than 1, implying that at the prevailing levels of technology, Jordan does not have a comparative advantage in the production of these crops. Currently, the yields for rainfed wheat and barley are significantly lower than irrigated wheat. Through proper non price measures, such as improvements in cropping practices, introduction of high yielding varieties, improvements in comparative advantage in the production of these crops could be achieved.

2. Vegetables

Tomatoes, potatoes and watermelons are the major vegetables produced under irrigation in the Highlands. Under the prevailing market conditions, both tomatoes and potatoes are highly profitable, generating profits of JD 234.66 and JD 228.97 per dunum respectively. However, the production of watermelons at prevailing prices is not profitable. The cost of production in the case of watermelons, at private prices, exceeds the revenues and, as a result, the crop is incurring net loss (negative profit). However the situation with regard to profits at social prices is different. The social profits for tomatoes and watermelons are positive, while that of potatoes are negative.

The NPCs for tomatoes and potatoes indicate that domestic prices of these crops are higher than comparable border prices. The NPC for watermelons, on the other hand, shows that the domestic market prices are significantly lower than the border prices. On the input side (both tradable and factors of production), producers of all these crops are enjoying considerable protection. As confirmed by EPCs, the producers of tomatoes and potatoes are positively protected and that of watermelons are negatively protected.

The DRCs for tomatoes and watermelons indicate that Jordan has a comparative advantage in the production of these crops. On the other hand, the DRC for potatoes indicates that Jordan is not an efficient producer of the said crop in the Highlands; in other words, it has a comparative disadvantage. The prevailing structure of incentives for watermelons and potatoes is incompatible with the principles of efficiency. In the case of watermelons, the depressed output prices discriminate against the production of an efficient crop. While in the case of potatoes, excessive incentives are provided to the production of an inefficient crop.

3. Fruits

Olives and grapes are the main fruits produced in the Highlands both under irrigated and rainfed conditions. In 1994, the total area cultivated with fruit trees amounted to 891,600 dunums of which 582.500 and 132,400 dunums were planted with olives and grapes respectively. Irrigated olives and grapes are highly profitable crops and generate significant private profits. In contrast, social profit of irrigated olives is negative, implying a net loss in the production of this crop. Social profit generated per dunum of irrigated grapes is significantly positive and sizable.

The NPCs for irrigated olives confirm a positive protection but a marginal negative protection for the irrigated grapes. However, both irrigated olives and grapes enjoy positive incentives on costs of inputs and factors of production.

The DRC for irrigated olives demonstrates a comparative disadvantage in the production of the crop in the Highlands, under the prevailing conditions. On the other hand, it confirms a significant comparative advantage in the production of irrigated grapes.

The production of rainfed olives and grapes are profitable at both private and social prices in the Highlands. The NPC for rainfed olives indicates that the domestic output prices of the crop is higher than border prices, whereas the NPC for rainfed grapes indicates to the contrary. However, both rainfed olives and grapes receive positive incentives on some costs of production. The DRCs for both rainfed olives and grapes confirm the existence of comparative advantage in the production of these crops in the Highlands.

B. Results of Analysis in the Jordan Rift Valley

The Jordan Rift Valley is divided into four agro-climatical zones. The valley produces a wide variety of vegetables, fruits and small quantities of field crops. In 1994, the area planted with winter and summer vegetables amounted to 108,705 and 65,825 dunums respectively. The total area planted with fruit trees amounted to 68,869 dunums of which a sizable area of 53,464 dunums were planted with citrus trees.

Tomatoes, cucumbers, potatoes, eggplants, and onions are the major dominant vegetables under irrigation in the Jordan Valley (JRV). Citrus (mainly oranges) and bananas are the major fruits produced in the northern, central, and southern parts of the valley. Seedless grapes have recently been introduced in the valley. In what follows, results of analysis for each of the four agro-climatical zones of JRV are discussed separately.

1. Northern Jordan Rift Valley (zone 1, JRV)

(a) Vegetables

Tomatoes, cucumbers, peppers, squash, eggplants, onions, and green beans are the dominant vegetables grow in this zone.

Summary results on indicators of competitiveness, efficiency and policy impacts for Zone 1, JRV, are presented in Table 13. Production of all vegetables in the northern JRV are highly profitable. All these vegetables generate significantly large profits under both private and social conditions. The policy impact on prices of output demonstrates that output prices received by growers of all vegetables grown in this zone are significantly lower than comparable border prices. It further shows that tradable inputs and some primary factors used in producing these vegetables are highly subsidized. However, the net transfer measuring the overall effect of policy on these vegetables is negative.

The NPCs indicate that domestic prices of all vegetables are much lower than their comparable border prices. This situation may discourage private investment in further

TABLE 13. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE NORTHERN JORDAN RIFT VALLEY (ZONE 1,JRV)

ITEMS	CUCUMBERS PLASTIC HOUSE	TOMATOES PLASTIC HOUSE	PEPPERS PLASTIC HOUSE	TOMATOES OPEN FIELD	ONIONS	GREENBEANS OPEN FIELD	EGGPLANTS OPEN FIELD	SQUASH OPEN FIELD	BANANAS	ORANGES
PRIVATE PROFIT	1695.46	1575.45	1240.76	273.17	239.57	224.60	77.32	38.62	184.69	252.89
SOCIAL PROFIT	2885.72	3154.49	2755.65	572.51	249.04	531.42	221.84	288.82	76.90	189.77
PVA(A-B)	2109.04	1989.03	1543.94	360.02	328.78	306.25	159.63	147.14	343.75	357.06
SVA(E-F)	3333.14	3619.97	3095.33	683.98	355.43	629.27	326.33	354.83	367.90	364.44
OUTPUT TRANSFER	-1388.75	-1742.39	-1651.87	-360.92	-52.24	-353.49	-203.82	-240.47	-42.86	-38.61
INPUT TRANSFER	-164.65	-111.45	-100.48	-36.96	-25.58	-30.47	-37.11	-32.79	-18.71	-31.23
FACTOR TRANSFER	-33.83	-51.90	-36.50	-24.62	-17.19	-16.21	-22.18	-17.49	-131.94	-70.50
NET TRANSFER	-1190.27	-1579.03	-1514.89	-299.34	-9.46	-309.81	-144.52	-190.20	107.79	63.12
PCR (C/A-B)	0.20	0.21	0.20	0.24	0.27	0.27	0.52	0.74	0.46	0.29
DRC(G/E-F)	0.13	0.13	0.11	0.16	0.30	0.16	0.32	0.36	0.79	0.48
NPCo(A/E)	0.68	0.58	0.53	0.58	0.89	0.53	0.59	0.52	0.91	0.92
NPCi (B/F)	0.83	0.78	0.75	0.78	0.74	0.75	0.79	0.77	0.81	0.79
PC (D/H)	0.59	0.50	0.45	0.48	0.96	0.42	0.35	0.17	2.40	1.33
EPC{(A-B)/(E-F)}	0.63	0.55	0.50	0.53	0.93	0.49	0.49	0.41	0.93	0.98
MTD{(D-H)/(E-F)}	-0.36	-0.44	-0.49	-0.44	-0.03	-0.49	-0.44	-0.54	0.29	0.17

expansion of vegetable production in Zone 1, JRV. The EPCs, measuring the net impact of policy on prices of input and output combined, show negative protection or potential tax on vegetable enterprises.

The DRC, which gives information on the amount of domestic resources used to earn or save a unit of foreign exchange, measures the comparative advantage in production. A DRC less than 1 indicates that few domestic resources are needed or used to generate sizable foreign exchange, a clear reflection of comparative advantage in the production of a particular crop. The lower DRC actually signifies efficiency in the production system and guides production decisions in support of efficient crops. In the case of vegetables under study, the DRCs are significantly less than 1, confirming a strong comparative advantage in the production of these crops locally. In other words, the northern Jordan Rift Valley is producing vegetables very efficiently. An upward adjustment of local prices to match with border prices will further encourage investments in expanding the production of these efficiently produced crops.

(b) Fruits

Oranges and bananas are the dominant fruit produced in the northern Jordan Rift Valley. The summary results of analysis contained in Table 13, also indicate that the producers of oranges and bananas are making sizable profits per each dunum of cultivated land. The production of oranges and bananas are profitable under both private and social conditions. The policy environment, under which these fruits are produced show a negative protection (implicit tax) on output prices, and positive incentives and protection on the input and factor side.

This fact is further confirmed by the protection coefficients. The NPCs of oranges and bananas show that domestic producers prices are lower than comparable border prices, while on the input side they confirm the existence of subsidies. The EPCs for oranges and bananas confirm negative protection. However, when the sizable subsidies on factors of production are taken into consideration, the production systems of oranges and bananas are positively protected and generate excessive private profits much larger than social profits. In the absence of market intervention, however, these crops still generate sizable profits.

The DRCs indicate that Zone 1 has a strong comparative advantage in the production of oranges followed by moderate comparative advantage in the production of bananas. The elimination of distortions on the output prices may lead to higher efficiency gains.

2. Central Jordan Rift Valley (zone 2, JRV)

(a) Vegetables

Cucumbers, peppers, tomatoes, potatoes, green beans, eggplants and squash are the major vegetables grown in the central JRV. In 1994, the area planted with irrigated winter and summer vegetables in Zone 2 of JRV amounted to 27,099 and 29,154 dunums respectively.

TABLE 14. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE CENTRAL JORDAN RIFT VALLEY (ZONE 2,JRV)

ITEMS	CUCUMBERS PLASTIC HOUSE	TOMATOES OPEN FIELD	PEPPERS PLASTIC HOUSE	GRAPES	POTATOES	GREENBEANS OPEN FIELD	EGGPLANTS OPEN FIELD	SQUASH OPEN FIELD	BANANAS	ORANGES
PRIVATE PROFIT	1262.48	1065.92	1217.50	183.82	61.92	323.81	93.93	61.15	568.44	38.61
SOCIAL PROFIT	2206.30	1985.29	2578.69	466.92	-7.99	730.46	350.52	214.99	491.25	-23.60
PVA(A-B)	1638.64	1222.94	1472.36	293.67	141.20	414.55	206.83	173.71	713.91	125.96
SVA(E-F)	2635.78	2181.40	2871.46	643.47	96.17	833.54	492.05	349.84	781.58	143.65
OUTPUT TRANSFER	-1166.55	-995.65	-1486.69	-367.63	-8.60	-449.90	-322.95	-210.49	-86.60	-22.39
INPUT TRANSFER	-169.41	-37.19	-87.59	-17.83	-53.63	-30.90	-37.74	-34.36	-18.93	-4.70
FACTOR TRANSFER	-53.32	-39.09	-37.92	-66.70	-24.87	-12.34	-28.62	-22.28	-144.86	-79.89
NET TRANSFER	-943.82	-919.37	-1361.18	-283.10	69.90	-406.65	-256.59	-153.84	77.19	62.21
PCR (C/A-B)	0.23	0.13	0.17	0.37	0.56	0.22	0.55	0.65	0.20	0.69
DRC(G/E-F)	0.16	0.09	0.10	0.27	1.08	0.12	0.29	0.39	0.37	1.16
NPCo(A/E)	0.68	0.58	0.53	0.52	0.98	0.53	0.51	0.58	0.90	0.91
NPCi (B/F)	0.83	0.79	0.69	0.86	0.83	0.75	0.78	0.78	0.81	0.96
PC (D/H)	0.57	0.54	0.47	0.39	-7.75	0.44	0.27	0.28	1.16	-1.64
EPC{(A-B)/(E-F)}	0.62	0.56	0.51	0.46	1.47	0.50	0.42	0.50	0.91	0.88
MTD{(D-H)/(E-F)}	-0.36	-0.42	-0.47	-0.44	0.73	-0.49	-0.52	-0.44	0.10	0.43

Summary results on indicators of competitiveness, efficiency and policy impacts for Zone 2 of JRV are presented in Table 14. The production of all vegetables in Zone 2 are highly profitable under prevailing market prices. The social profits are even larger for all vegetables, except potatoes. Social profit of potatoes is actually negative, indicating that without policy support the production of potatoes is not sustainable. All other vegetables produced in this Zone will generate even higher profits in the absence of policy intervention.

The policy impact on output prices points to a negative protection or implicit tax. Since generally, there is no explicit tax on the prices of agricultural outputs, the prevailing rigid retail price policy and monopoly in wholesale markets implicitly imposes a tax on output prices to the benefit of consumers. As compensatory measures, most input prices and factors of production are provided at subsidized rates to producers. However, these measure do not cancel out the negative protection on output prices and, as a result, the policy impact in form of net transfers still creates an overall negative protection for vegetable enterprises in Zone 2, JRV.

The NPCs indicate that all vegetable prices are lower than the comparable border prices. The EPCs confirm negative protection for all vegetables in Zone 2, except for potatoes where positive protection is the case.

The DRCs for all vegetables, but potatoes, demonstrate that the central JRV has a strong comparative advantage in the production of these crops. The DRC for potatoes, on the other hand, points to comparative disadvantage. In other words, Zone 2 is not an efficient producer of potatoes.

(b) Fruits

Bananas, grapes, and oranges are the major fruits produced in the central Jordan Rift Valley. The production of bananas followed by grapes is highly profitable under both private and social conditions. However, oranges generate a moderate positive private profit, while at social prices the profit is negative. The policy impact analysis confirms negative protection on the output prices and positive protection on prices of inputs and some factors of production.

The NPCs and EPCs both point to negative protection of fruit enterprises in Zone 2, JRV. Analysis of DRCs for fruit crops indicates that the central Jordan Rift Valley is a very efficient producer of grapes and bananas, and it has a strong comparative advantage. On the other hand, the DRC for oranges points to inefficiency or comparative disadvantage in this zone.

3. Southern Jordan Rift Valley (zone 3, JRV)

(a) Vegetables

Tomatoes, peppers, watermelons, squash, cucumbers, eggplants, and cantaloupes are the main vegetables produced in the southern Jordan Rift Valley. In 1994, area cultivated with winter and summer vegetables amounted to 19,615 and 7,712 dunums respectively.

TABLE 15. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE SOUTHERN JORDAN RIFT VALLEY (ZONE 3,JRV)

ITEMS	CUCUMBERS OPEN FIELD	TOMATOES OPEN FIELD	PEPPERS OPEN FIELD	GRAPES	CANTALOUPE PLASTIC TUNNEL	WATERMELON OPEN FIELD	EGGPLANTS OPEN FIELD	SQUASH OPEN FIELD	BANANAS	ORANGES
PRIVATE PROFIT	164.02	408.24	274.09	-16.28	623.12	139.06	148.08	101.27	307.15	-1.00
SOCIAL PROFIT	344.27	879.93	762.97	73.82	509.90	63.89	441.64	347.00	204.16	-69.66
PVA(A-B)	300.02	492.34	382.18	82.21	706.02	226.25	249.63	208.31	453.71	87.57
SVA(E-F)	507.79	1004.25	900.55	242.19	621.65	180.12	575.22	478.55	493.26	98.62
OUTPUT TRANSFER	287.01	-549.83	-579.80	-175.37	32.63	-12.01	-363.32	-304.60	-57.80	-18.69
INPUT TRANSFER	-79.24	-37.92	-61.43	-15.39	-51.74	-58.14	-37.74	-34.36	-18.25	-7.64
FACTOR TRANSFER	-27.52	-40.22	-29.49	-69.87	-28.85	-29.05	-32.02	-24.51	-142.54	-79.70
NET TRANSFER	-180.25	-471.69	-488.89	-90.10	113.22	75.18	-293.56	-245.73	102.99	68.65
PCR (C/A-B)	0.45	0.17	0.28	1.20	0.12	0.39	0.41	0.51	0.32	1.01
DRC(G/E-F)	0.32	0.12	0.15	0.70	0.18	0.65	0.23	0.27	0.59	1.71
NPCo(A/E)	0.68	0.53	0.48	0.52	1.04	0.98	0.51	0.52	0.90	0.91
NPCi (B/F)	0.80	0.78	0.72	0.87	0.78	0.81	0.78	0.78	0.82	0.93
PC (D/H)	0.48	0.46	0.36	-0.22	1.22	2.18	0.34	0.29	1.50	0.01
EPC{(A-B)/(E-F)}	0.59	0.49	0.42	0.34	1.14	1.26	0.43	0.44	0.92	0.89
MTD{(D-H)/(E-F)}	-0.35	-0.47	-0.54	-0.37	0.18	0.42	-0.51	-0.51	0.21	0.70

Summary results on indicators of competitiveness, efficiency and policy impacts for the southern Jordan Rift Valley, Zone 3, are presented in Table 15. At the prevailing market prices, the production of all vegetables grown in the southern JRV is very profitable. The social profits are also sizable and in most cases even larger than private profits. This situation clearly indicates that in the absences of distortions, the vegetable enterprises in Zone 3 will generate huge profits. Analysis of policy impact demonstrates a negative protection on output prices, except for cantaloupes and positive protection on prices of inputs and factors of production. Overall, cantaloupes and watermelons enjoy positive protection and generate higher profits with policy interventions.

The NPCs indicate that producers prices of vegetables, except for cantaloupes, in Zone 3 are less than the comparable border prices, and the prices of inputs are subsidized. The EPCs show positive protection for cantaloupes and watermelons, but negative protection for all the rest.

Analysis of DRCs confirms the efficiency and strong comparative advantage in the production of all vegetables in this zone. The market signals stimulated by the policy should normally encourage the production of efficient enterprises.

(b) Fruits

Bananas, grapes, and oranges are the main crops produced in Zone 3 of JRV. In 1994, area planted with bananas and oranges amounted to 7,000 and 2,280 dunums respectively. Zone 3, actually, is considered a main producing area of bananas.

At the prevailing market prices, the production of bananas is highly profitable. The bananas enterprises also generate positive social profits. However, the situation with regard to grapes and oranges is different. At the prevailing market prices, the grape and orange enterprises incur net losses (negative private profits). However, social profit of grapes is positive, while it is negative in the case of oranges.

The analysis of policy transfers indicate that producers of fruits in Zone 3 enjoy positive protection on prices of inputs and factors of production. On the output side, they encounter negative protection. This fact is further confirmed by NPCs and EPCs in the case of fruit crops. The DRCs for bananas and grapes indicate moderate comparative advantage while in the case of oranges reveal comparative disadvantages.

4. Ghor Safi and Wadi Araba (zone 4, JRV)

(a) Vegetables

Tomatoes, watermelons, green beans, eggplants, and cantaloupes are the main vegetables produced in the Ghor Safi and Wadi Araba, JRV.

Summary results on indicators of competitiveness, efficiency and policy impacts for Zone 4, JRV, are presented in Table 16. At the prevailing market prices, private profits of all vegetables, except eggplants and cantaloupes, are significantly positive. Due to high costs of production, the private profits for both eggplants and cantaloupes are negative, implying

TABLE 16. INDICATORS OF COMPETITIVENESS, EFFICIENCY AND POLICY IMPACTS CALCULATED FOR MAJOR CROPS GROWN IN THE GHOR SAFI AND WADI ARABA, JORDAN RIFT VALLEY (ZONE 4,JRV)

ITEMS	CANTALOUPE OPEN FIELD	SP-TOMATOES OPEN FIELD	WATERMELON OPEN FIELD	AU-TOMATOES OPEN FIELD	GRAPES	GREENBEANS OPEN FIELD	EGGPLANTS OPEN FIELD
PRIVATE PROFIT	-51.30	205.41	227.52	239.16	118.33	308.19	-4.64
SOCIAL PROFIT	-138.86	490.63	156.37	546.16	359.98	711.90	148.34
PVA(A-B)	50.71	313.20	329.53	347.28	239.14	411.75	124.44
SVA(E-F)	-8.56	641.13	286.67	700.02	560.31	858.40	320.11
OUTPUT TRANSFER	8.70	-357.39	-14.54	-384.88	-339.77	-452.70	-201.85
INPUT TRANSFER	-50.57	-29.45	-57.40	-32.13	-18.60	-6.05	-6.18
FACTOR TRANSFER	-28.29	-42.72	-28.29	-45.75	-79.53	-42.94	-42.68
NET TRANSFER	87.56	-285.22	71.15	-306.99	-241.64	-403.71	-152.98
PCR (C/A-B)	2.01	0.34	0.31	0.31	0.51	0.25	1.04
DRC(G/E-F)	-15.22	0.23	0.45	0.22	0.36	0.17	0.54
NPCo(A/E)	1.04	0.53	0.98	0.53	0.50	0.53	0.51
NPCi (B/F)	0.79	0.76	0.81	1.74	0.85	0.94	0.94
PC (D/H)	0.37	0.42	1.46	0.44	0.33	0.43	-0.03
EPC{(A-B)/(E-F)}	-5.92	0.49	1.15	0.50	0.43	0.48	0.39
MTD{(D-H)/(E-F)}	-10.23	-0.44	0.25	-0.44	-0.43	-0.47	-0.48

a net loss. The social profit for cantaloupes is also significantly negative, a clear indication that production of cantaloupes is not sustainable with the current structure of incentives and technology. Social profits of all other vegetables are significantly positive and larger than private profits, except for watermelons.

Analysis of policy impact (transfers) confirms negative protection on output prices of all vegetables, except for cantaloupes which enjoy positive protection. However, transfers on input and most factors of production reflect positive protection for all vegetables in Zone 4 of JRV. Analysis of NPCs indicate that the cantaloupes are positively protected, while all the rest are negatively protected. Analysis of EPCs, on the other hand, confirms positive protection for watermelons and negative protection for all the rest .

The DRCs reveal that Zone 4 has significant comparative advantage in the production of all vegetables, except cantaloupes. Zone 4 is extremely inefficient in the production of cantaloupes.

(b) Fruits

Grapes are the only major fruit grown in Ghor Safi and Wadi Araba, JRV. The production of grapes are highly profitable under both private and social conditions.

Analysis of policy impact indicates that the output prices of grapes are lower than comparable border prices. However, inputs and most factors of production are provided to grape growers at subsidized rates. Overall, the grape enterprises are negatively protected. This fact is further confirmed by the NPC and EPC of grapes.

The DRC demonstrates that Zone 4 is very efficient in the production of grapes and enjoys a good comparative advantage.

VII. CONCLUSIONS AND RECOMMENDATIONS

Prior to the economic difficulties of 1988, the Government policies were aimed at increasing income of farmers and agricultural workers as well as improving their standard of living. Further, these policies also aimed at increasing self-sufficiency level and providing the people with adequate food at affordable prices, through encouraging expansion of domestic production, subsidizing output prices of a number of food products and enforcing price controls on most food products. These policies placed a huge burden on the Government budget.

The trade policies applied to agricultural products attempted to balance the interest of both producers and consumers. The trade and price policies applied throughout most of 1980's were aimed to counterbalance, with price controls, the protection enjoyed by producers of local products. The administration of this system of trade instruments, primarily import quotas and domestic price control, led to increased Government intervention. Public marketing institutions were awarded privileges and import monopolies, with apparent discrimination against the private sector.

Since 1989, the Government of Jordan enacted policy reforms, the most significant of which has been the adoption of agricultural Sector Adjustment Program to achieve equity, sustainability, efficiency, and minimum Government intervention. The proposed reforms aim at removing subsidies, discontinuing the retail price policy for fresh fruits and vegetables as well as removing import monopolies on agricultural commodities. The reforms also aims at improving the sustainability of economic resources, particularly water, by formulating and implementing a national water resource policy focusing at the regulation of water consumption and a more efficient use, and establishing a new system of charges that will cover all cost of irrigation water.

The analysis in this report focused on the impact of public policies such as input-output prices, factor prices, credit subsidies and that of the exchange rate on the competitiveness and efficiency of major crops grown in the Highlands and in the Jordan Rift Valley. The evaluation of these policies was conducted through the construction of detailed crop budgets at private and social prices and policy analysis matrices. Coefficients of protection and comparative advantage were also calculated to determine the levels of protection and efficiency under which the selected crops are produced in the Highlands and in the Jordan Rift Valley. The findings are expected to provide pertinent information to policy makers in the design of future price and trade policies, as they reveal the extent of price distortions in agriculture and determine the comparative advantage of each major crop.

The following could be concluded from the results of analysis:

The current official exchange rate of the Jordanian Dinar against the US Dollar is overvalued by over 12 per cent, as compared with its imputed equilibrium. An overvalued exchange rate has an adverse effect on the competitiveness of Jordanian exports in general and agricultural exports in particular.

The current policy environment is conducive to the production of wheat and barley in the Highlands. As confirmed by the NPCs and EPCs as well as by the indicator of overall policy impacts, the producers of these crops enjoy positive protection on input-output prices and some factors of production.

On the other hand, review of DRCs reveal that Jordan does not have comparative advantage in producing these cereal crops in the Highlands. The most severe comparative disadvantage is evidenced in the case of irrigated wheat followed by less severe comparative disadvantage in case of both rainfed wheat and barley. This situation warrants a shift in support from the production of inefficient crops to those in which Jordan has a clear-cut comparative advantage. This act will lead to efficient use of resources and increased production of high value crops.

Review of NPCs, EPCs and the indicators of overall policy impacts has shown that of the three main vegetables produced in the Highlands, namely tomatoes, potatoes and watermelons, the first two are positively protected while the latter is negatively protected.

Review of DRCs, on the other hand, indicates that Jordan has comparative advantage in the production of tomatoes and watermelons and a comparative disadvantage in the production of potatoes. Apparently, the prevailing structure of incentives for watermelons and potatoes is incompatible with the principles of efficiency. In the case of watermelons, depressed output price discourages the expansion of an efficient crop, while in the case of potatoes remunerative prices encourage the expansion of an inefficient crop.

The NPCs and EPCs for both irrigated and rainfed olives indicate that the current pricing policy provides positive incentives to growers of olives in the Highlands. The DRCs, on the other hand, confirm a comparative advantage for rainfed olives only, while that of a comparative disadvantage for irrigated olives.

The structure of incentives with regards to output prices for both irrigated and rainfed grapes is almost neutral; it neither supports nor discriminates against grapes production. The DRCs demonstrate the existence of strong comparative advantage for grapes grown in the Highlands.

All vegetables produced in the four agro-ecological zones of the Jordan Rift Valley generate impressive profits at both private and social prices, with the exception of potatoes (negative social profits) in Zone 2, cantaloupes (negative private and social profits) and eggplants (negative private profit) in Zone 4.

Review of NPCs and EPCs reveals that, despite the existence of some subsidies on prices of tradable inputs, the overall policy environment creates negative protection for growers of all vegetables in JRV, except for potatoes in Zone 2, cantaloupes and watermelons in Zone 3 and 4 which enjoy positive protection.

Analysis of DRCs confirms the existence of strong comparative advantage in the production of all vegetables in all four zones of the JRV-- save potatoes in Zone 2, cantaloupes in Zone 4, where comparative disadvantages are confirmed.

The situation with regards to fruit crops is slightly different as compared with vegetables. The production of bananas (mainly grown in Zone 1, 2, and 3 of JRV) is profitable at both private and social prices.

The NPCs and EPCs confirm negative protection on bananas, while the indicators of the overall policy impacts due to the existence of subsidies on some factors of production confirm positive protection. Review of DRCs indicates that the JRV has comparative advantage in the production of bananas.

Likewise, the production of grapes is highly profitable in the JRV at both private and social prices-- except in Zone 3, where private profit is negative. The NPCs and EPCs as well as the indicators of overall policy impacts demonstrate negative protection for the grape enterprises. The DRCs, on the other hand, reveals the existence of comparative advantage in the production of grapes in the JRV.

The production of oranges is highly profitable at both private and social prices only in Zone 1, followed by a positive private but a negative social profit in Zone 2, and both negative private and social profits in Zone 3. The NPCs and EPCs indicate negative protection on oranges, however, indicators of the overall policy impacts confirm positive protection on orange enterprises. The DRCs confirm comparative advantage in the production of oranges in Zone 1 and that of comparative disadvantage in Zone 2 and 3.

Review of the coefficients of nominal and effective protection and overall policy impacts has shown that there exist significant distortions (divergence) in the farmgate prices of agricultural outputs, tradable inputs as well as some primary factors of production. The distortions imposed by positive or negative protection are generally the results of Government pricing, trade and macroeconomic policies.

The overall pattern of policy intervention leading to distortions with regards to commodity groups and resource use has been mixed. Some of the distortions could be attributed to policies in pursuit of self-sufficiency -- later on changed to self-reliance -- for cereals where the Government has provided direct support to producers of grains or in most other cases directly subsidized the primary factors of production mainly water and credit. On the other hand, more important than the direct effects of sectoral policies have been the indirect effects on agricultural production incentives of industrial protection and exchange rate overvaluation and trade restrictions. The exchange rate overvaluation represented an implicit tax on agricultural exports and a subsidy to agricultural imports competing with domestic production.

Distortions whether generated by either direct or indirect policy intervention are not conducive to the development of productive and efficient resource use and sustainable growth of the agricultural sector. Distortions generally cause efficiency losses and resource misallocations.

On the outset before suggesting any policy options, it must be stated briefly that the Government of Jordan has initiated a number of policy reforms and measures to liberalize the pricing systems and trading regimes. The agriculture sector is now in a period of transition with action on some policy measures having been completed, some initiated recently. Most of the reforms initiated so far, aim at improving efficiency, sustainability, equity and market led agricultural development.

The reform process is an ongoing exercise and most of the changes introduced may not be captured by the data analyzed for this study, because of the time lag in the production process of the agricultural produce, the effects of which will take longer time to be materialized. As such, the findings in this study represent a base case scenario and the effect of changes introduced through the reform process to be monitored and evaluated at regular intervals from here onwards.

The Government in the overall context of developing the agricultural sector on a sustainable basis may consider pursuing the following policy options to enhance efficiency and sustainable use of resources as well as to improve agricultural productivity:

- In order to enhance the productivity and competitiveness of the agricultural sector on a sustainable basis, policy options compatible with the principles of efficiency and sustainability to be pursued. It is recognizable that Government may use agricultural price policy to pursue a variety of development objectives like equity and income distribution. As such, promoting efficiency is not an end in itself, but it is necessary for improving economic opportunities on a sustainable basis. Hence, efficiency considerations cannot be ignored, for in the long run only the efficient commodity systems will be sustainable. In this context, a gradual realignment of the domestic prices with comparable border prices is called for. Border prices reflect opportunity cost and according to the logic of border price paradigm, domestic prices that systematically diverge from border prices entail efficiency losses and have major development costs. Thus the use of border prices as a guide for domestic prices has a strong logical base. Border prices reflect underlying global supply and demand balances and hence serve as basis for determining the comparative advantage for agriculture in individual countries. It goes without saying that the more a Government policy departs from border prices the greater the difficulty it will have in preventing leakages and distortions in other sectors.

- Analysis of the DRCs confirms that Jordan does not enjoy any comparative advantage in the production of irrigated wheat. The opportunity cost of saving or earning foreign exchange per unit use of domestic resources is too high to justify further expansion of the irrigated wheat in the future. In other words, it is economically much cheaper to import wheat than grow it in the irrigated farming system. Therefore, it is advisable to gradually discourage the production of irrigated wheat and the resources released to be used in support of crops where a clear cut comparative advantage exists, such as horticultural crops (fruits and vegetables).

- It is also to be noted that Jordan does not enjoy comparative advantage in the production of both rainfed wheat and barley, but the case is less severe as compared to irrigated wheat. In this context and in the absence of any other viable alternatives

the Government could pursue policies that will improve productivity and accordingly improve on efficiency of production. More specifically, through changes in technology, land improvements and changes in relative input costs or output prices comparative advantage of rainfed crops will improve over time.

- The same is true in the cases of potatoes and irrigated olives where at the moment Jordan does not enjoy comparative advantage, but improvements through the introduction of improved technologies are possible. At present, with the current level of technology and costs of production the production of these crops are not economical and in the absence of any possibility for introducing improved technologies further expansion of these crops to be discouraged, as without policy intervention the production systems are not sustainable.

- On the positive side, Jordan enjoys comparative advantage in the production of tomatoes, watermelons, both irrigated and rainfed grapes as well as rainfed olives in the Highlands. Investments in further expansion of these crops could generate significant efficiency gains.

- Similarly, all fruits and vegetables -- but oranges, cantaloupes and potatoes -- are efficiently produced in the Jordan Rift Valley and Jordan enjoys significant comparative advantage. As such, the expansion of these crops should be encouraged with the aim of significantly increasing value added in the agriculture sector subject to market and demand constraints. Currently, the producer prices of fruits and vegetables are below their comparable border prices indicating implicit tax. However, higher border prices should stimulate more active national production and trade policies. Policy instruments such as subsidies and taxes, import tariffs, unaligned exchange rate and other trade policy mechanisms cause distortion of the producer price and divergence of that price from its wider equilibrium border (international) prices. Discrimination against export commodities is deleterious to economic efficiency and growth, shifting resources to less productive sectors and depriving the economy generally and the agriculture sector specifically of vital foreign exchanges. There is a recognizable need to pursue vigorously policies and actions that will not contravene the underlying principles of economic efficiency. Further expansion of horticultural crops in which Jordan's comparative advantage lies depends critically on the availability of the necessary transport, processing and marketing infrastructure as well as development of additional export markets. Measures could be implemented to promote exports and market efficiency. Strengthening the focus of extension and research on exportable commodities should lead to increased exports. Moreover, a strengthened research-extension system is also crucial for achieving increased agricultural productivity and product diversification at the farm level. In addition, further export promotion could be achieved through export market diversification, quality and grade improvement, removal of price distortions as well as securing future cooperation agreements with major trading partners and enhancing trade liberalization. In this context, the disincentives on the export commodities due to be exchange rate overvaluation should be countered with gradual realignment of the exchange rate towards its equilibrium level. This will enhance the competitiveness of agricultural exports in international markets and will encourage private investment in further expansion of export commodities.

- Analysis of DRCs in the case of the Jordan Rift Valley has shown that Jordan does not enjoy, to a large extent, any comparative advantage in the production of cantaloupes in zone 4. Similarly, zone 2 of JRV is not efficient in the production of potatoes. Thus policy support in further expansion of these crops to be discontinued.

- Likewise, Jordan does not enjoy to a large extent comparative advantage in the production of oranges in zone 3 of JRV and to a lesser extent in zone 2 of JRV. In contrast, it enjoys comparative advantage in the production of oranges in zone 1 of JRV. Further expansion of orange enterprises in zone 1 of JRV is highly justifiable on grounds of efficiency and productivity. However, with the current technology, further expansion of orange enterprises in zone 2 in general and zone 3 in particular to be discouraged.

- In summarizing the foregoing, Jordan's comparative advantage lies in the production of fruits and vegetables. From an efficiency point of view, the agriculture sector should encourage the production of those crops for which it is internationally competitive and for which a sufficient demand exists. Efforts should be exerted to promote and encourage agricultural exports. Forward-looking price and technology policies along with open economic market policy are very much needed to stimulate productivity, increase production and improve value added in agriculture. Price policy should aim at facilitating better resource use efficiency and allocation.

- In line with the economic reform process in which the Government is committed to liberalize its economy and create the right investment climate, distortion in input-output prices as well as primary factors of production should be removed gradually and efficient use of land and water resources and productivity enhancing technologies should be encouraged.

- Agricultural price policy, however well-designed and intentioned, could accomplish very little in the context of an unfavorable macroeconomic environment. There are the whole range of macroeconomic policies -- particularly interest and exchange rate policies -- which affect the overall profitability of the agriculture sector and the choice of individual crops. Because of these linkages between agricultural price policy and the rest of the economy, price policy analysis is necessarily a complex task and in order to be effective it must be forward-looking.

- In such circumstances it is fundamental that Government further enhance the analytical capacity to monitor, evaluate, and recommend policy with respect to agricultural prices. This analytical capacity must also encompass the ability to assess the impact of macroeconomic policies, including exchange rate and trade policies on agriculture as well as the ability to design and analyze agricultural policy options. An institutional capacity-building in developing the necessary database and to carrying out policy analysis -- taking into consideration the relevance of a wide variety of analytical techniques available to assess the potential impact of different policy choices -- is very essential at this critical stage of emerging changes and developments.

- The computerized database prepared for the current study is a modest contribution to the development of a database for policy analysis, the contents of which could be further refined and expanded on a regular basis for future policy analysis. ESCWA in close collaboration with GTZ could assist the Ministry of Agriculture in Jordan to develop institutional capacity in analytical skills and database for policy analysis.

ANNEXES

ANNEX A

VEGETABLES

A1. TOMATOES

(Thousand Tons)

Year	Production	Imports	Processing	Exports	Consumption	Self Sufficiency %
1985	392.3	21.0	0.0	108	305.3	128
1986	305.9	16.1	13.2	95.0	213.8	143
1987	268.4	4.6	22.6	94.5	155.9	172
1988	290.8	1.1	47.0	116.9	128	227
1989	331.3	0.0	55.8	219.7	55.8	594
1990	446.2	0.0	69.1	282	95.1	469
1991	329.1	0.1	15.5	159.0	154.7	213
1992	706	0.0	142.3	200.0	363.7	194
1993	621.2	0.0	76.1	154	391.1	159
1994	479.2	0.0	45.0	121.8	312.2	153
85-90	339.2	7.1	34.6	152.7	159.0	213
91-94	533.9	0.0	58.5	108.7	366.7	146

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 1.

A2. EGGPLANTS

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	67.3	3.3	31.7	47.9	159
1986	80	1.9	27	54.9	146
1987	48.9	0.0	22.7	26.2	187
1988	34.9	0.0	26.0	8.9	392
1989	35.1	0.0	28.9	6.2	566
1990	35.9	0.0	22.8	13.1	274
1991	40.6	0.0	27.7	12.9	315
1992	58.7	0.0	17.1	41.6	141
1993	40.4	0.0	15.1	25.3	160
1994	42.6	0.0	13.4	29.2	146
85-90	51.9	0.9	26.5	26.2	198
91-94	45.6	0.0	14.1	31.5	145

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 2.

A3. CUCUMBERS

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	124.7	0.2	58.5	66.4	188
1986	92.7	0.0	39.6	53.1	175
1987	110.7	0.0	43.3	67.4	164
1988	80	0.0	44.3	35.7	224
1989	87.4	0.0	52.2	35.2	248
1990	92.1	0.0	47.2	44.9	205
1991	102.6	0.0	24.7	77.9	132
1992	116.4	0.0	32.8	84	139
1993	100.6	0.0	17.8	82.8	121
1994	82.4	0.0	23.7	58.7	140
85-90	97.9	0.0	47.5	50.5	194
91-94	100.6	0.0	24.8	75.8	133

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 3.

A4. PEPPERS

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	27.5	0.0	19	8.5	324
1986	26.8	0.0	18.9	7.9	339
1987	30.8	0.0	20.5	10.3	299
1988	29.3	0.0	18.9	10.4	282
1989	35.9	0.0	32.1	308	945
1990	30.1	0.0	24.2	5.9	510
1991	18.0	0.0	12.5	5.5	327
1992	33.3	0.0	16.7	16.6	201
1993	25.1	0.0	13.1	12.0	209
1994	11.7	0.0	9.4	2.3	509
85-90	30.1	0.0	22.3	7.8	385
91-94	22.0	0.0	3.5	8.5	259

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 10.

A5. SQUASH

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self sufficiency %
1985	69.5	0.0	23.9	45.6	152
1986	51.9	0.0	18.0	33.9	153
1987	47.5	0.0	14.4	33.1	144
1988	33.3	0.0	14.9	18.4	181
1989	28.7	0.0	18.5	10.2	281
1990	37	0.0	18.5	18.5	200
1991	28	0.0	11.1	16.9	166
1992	58	0.0	11.8	46.2	126
1993	60.5	0.0	11.6	48.9	124
1994	43.1	0.0	10.2	32.9	131
85-90	44.7	0.0	18.0	26.6	168
91-94	47.4	0.0	11.2	36.2	131

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 8.

A6. POTATOES

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self sufficiency %
1985	26.2	16.0	8.7	33.5	78
1986	38.5	16.3	1.8	54.0	71
1987	48.2	8.9	10.6	46.5	104
1988	51.7	5.6	8.6	48.7	106
1989	40.1	8.3	4.8	43.6	92
1990	64.0	10.5	13.0	61.5	104
1991	76.7	12.8	4.3	85.2	90
1992	81.9	2.6	3.0	81.5	100
1993	117.6	2.5	3.7	116.6	101
1994	89.7	7.6	3.5	93.8	96
85-90	44.8	11.1	7.9	48.0	93
91-94	91.5	6.4	3.6	94.3	97

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 4.

A7. ONIONS

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	13.7	12.6	4.1	22.2	62
1986	21.4	19.8	2.1	39.1	55
1987	18.1	9.5	1.2	26.4	69
1988	44.5	6.8	1.0	50.3	89
1989	27.3	8.3	2.6	33.0	83
1990	25.5	11.4	0.9	36.0	71
1991	37.2	15.7	3.5	49.4	75
1992	45.9	7.0	0.6	52.3	88
1993	43.1	8.4	[illegible]	51.5	84
1994	62.7	5.9	0.4	68.2	92
85-90	25.1	11.4	2.0	34.5	73
91-94	47.2	9.2	1.1	55.3	85

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 6.

FRUITS

A1. CITRUS

(Thousand Tons)

Year	Production	Import	Export	Consumption	Self Sufficiency %
1985	158.2	11.2	118.7	151.7	104
1986	108.6	93.9	118.6	83.9	129
1987	125.8	79.4	79.3	125.9	100
1988	141.9	47.8	63.8	125.9	113
1989	124.7	34.4	70.4	88.7	141
1990	119.0	45.5	60.8	103.7	115
1991	154.0	38.9	43.5	149.4	103
1992	127.1	20.5	55.0	92.6	137
1993	175.8	5.3	78.6	102.5	172
1994	194.3	3.5	81.7	116.1	167
85-90	129.7	68.8	85.2	113.3	114
91-94	162.8	17.1	64.7	115.2	141

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 15.

A2. BANANAS

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self sufficiency %
1985	30.7	7.4	0.0	38.1	81
1986	27.8	7.6	0.0	35.4	78
1987	44.5	4.6	0.0	49.1	91
1988	30.9	5.9	0.0	36.8	84
1989	17.1	2.0	0.0	19.1	89
1990	19.1	2.6	0.0	21.7	88
1991	20.4	5.2	0.0	25.7	80
1992	18.3	1.1	0.0	19.4	94
1993	18.4	2.7	0.0	21.1	87
1994	20.9	1.2	0.0	22.1	95
85-90	28.4	5.0	0.0	33.4	85
91-94	19.5	2.6	0.0	22.1	88

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 18.

A3. GRAPES

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	52.6	7.9	2.0	58.5	90
1986	57.9	5.2	1.1	62.0	93
1987	55.6	6.2	0.9	60.9	91
1988	69.4	8.6	1.2	76.8	90
1989	78.9	2.6	2.5	79.0	100
1990	65.5	2.0	1.3	66.2	99
1991	75.4	0.8	0.5	75.7	100
1992	63.6	0.5	0.9	63.2	101
1993	54.8	2.9	1.2	56.4	97
1994	53.8	0.7	1.4	53.1	101
85-90	63.3	5.4	1.5	67.2	94
91-94	61.9	1.2	1.0	62.1	100

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 18.

A4. PICKLED OLIVES

(Thousand tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	5.6	0.0	0.5	5.1	110
1986	7.9	2.1	1.1	8.9	90
1987	6.9	0.3	0.5	6.7	103
1988	19.3	0.5	0.8	19.7	98
1989	4.8	1.7	1.2	5.3	91
1990	13.7	1.2	0.3	13.5	101
1991	8.4	0.8	0.3	8.9	95
1992	12.7	1.6	0.9	13.2	95
1993	7.4	1.2	0.6	8.0	93
1994	14.2	0.7	0.0	14.9	95
85-90	9.7	0.8	0.6	9.9	99
91-94	10.7	1.1	0.4	11.2	95

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 22.

FIELD CROPS

A1. WHEAT

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	62.8	387.9	64.1	386.6	16
1986	40.3	282.8	22.1	617.0	7
1987	109.3	576.8	69.0	617.1	18
1988	137.0	424.4	6.3	555.1	22
1989	86.0	183.3	21.0	248.3	35
1990	88.7	644.1	11.6	721.2	13
1991	57.8	779.8	0.0	837.6	7
1992	122.5	555.6	0.0	678.1	17
1993	67.8	667.0	0.0	734.8	9
1994	57.4	556.6	0.0	614	9
85-90	87.4	416.6	32.4	611.6	14
91-94	76.4	639.8	0.0	716.2	11

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 23.

A2. BARLEY

(Thousand Tons)

Year	Production	Imports	Exports	Consumption	Self Sufficiency %
1985	19.7	74.9	0.0	94.6	21
1986	14.5	143.5	0.0	158.0	9
1987	41.0	114.8	0.0	155.8	26
1988	50.0	98.0	0.0	148.0	34
1989	28.7	217.7	0.0	246.6	12
1990	36.4	209.5	0.0	245.9	15
1991	26.8	252.9	0.0	279.7	10
1992	103.2	293.5	0.0	396.7	26
1993	44.3	483.0	0.0	527.3	8
1994	34.2	471.9	0.0	506.1	7
85-90	31.7	143.1	0.0	174.8	18
91-94	52.1	375.3	0.0	427.4	12

Source: Agricultural Economic and Policy Department, Ministry of Agriculture, " Production and Consumption of Major Agricultural Products in Jordan", Amman, Jordan, 1995, p. 24.

ANNEX B

B1. PRIVATE BUDGETS OF MAJOR CROPS GROWN IN THE HIGHLANDS

Items	IRRIGATED WHEAT	RAINFED WHEAT	RAINFED BARLEY	TOMATOES	POTATOES	WATERMELON	IRRIGATED OLIVES*	RAINFED OLIVES*	IRRIGATED GRAPES*	RAINFED GRAPES*
Tradable Outputs										
- Crop produce (output) (JD)	58.80	15.75	12.00	632.75	710.70	154.10	166.25	61.43	876.90	112.90
- By-product (if any) (JD)	24.00	6.30	7.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	21.42	7.59	6.99	70.65	143.82	23.29	23.63	9.27	41.30	18.69
- Seeds/Seedlings (JD)	1.68	1.40	0.80	27.50	100.00	6.65	1.98	1.24	5.95	4.95
- Seed Transplanting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	2.70	0.60	1.38	3.00	3.18	1.70	7.11	0.00	11.64	0.00
- Phosphorus (JD)	5.29	1.29	0.41	2.30	2.44	2.04	1.27	0.00	5.74	0.00
- Potash (JD)	0.00	0.00	0.00	5.85	6.20	3.60	4.45	0.00	4.23	0.00
- Plant Protection Chemicals (JD)	1.00	0.60	0.50	25.00	20.00	6.50	2.73	2.73	6.73	6.73
- Mulch (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Machinery										
- Land Preparation (JD)	6.00	2.80	2.40	6.00	6.00	2.80	3.60	3.68	5.39	5.39
- Sowing/planting (JD)	0.75	0.60	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	1.00	0.30	0.50	1.00	6.00	0.00	2.49	1.62	1.62	1.62
- Harvesting (JD)	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Non-Tradable Inputs	37.30	9.82	9.82	301.40	306.40	167.40	79.16	30.91	114.74	42.13
- Water Requirement (JD)	35.00	0.00	0.00	175.00	196.00	105.00	13.11	0.00	29.89	0.00
- Manure (JD)	0.00	0.00	0.00	10.00	12.00	0.00	10.95	10.95	17.97	8.49
- Manual Labor										
- Land Preparation (JD)	0.40	0.00	0.00	7.20	6.80	2.80	1.31	0.87	4.88	4.88
- Sowing/Planting (JD)	0.00	0.32	0.32	5.20	5.60	1.60	0.19	0.12	0.99	0.99
- Husbandry (JD)	1.60	0.00	0.00	22.40	14.00	7.60	8.09	7.79	13.28	13.28
- Harvesting (JD)	0.00	2.00	2.00	41.60	32.00	10.40	5.51	3.68	7.73	6.99
- Capital Cost (JD)	4.11	1.22	1.18	26.04	31.52	13.35	7.11	2.81	9.72	4.26
- Land Rent (JD)	0.30	7.50	7.50	40.00	40.00	40.00	40.00	7.50	40.00	7.50

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B2. SOCIAL BUDGETS OF MAJOR CROPS GROWN IN THE HIGHLANDS

Items	IRRIGATED WHEAT	RAINFED WHEAT	RAINFED BARLEY	TOMATOES	POTATOES	WATERMELON	IRRIGATED OLIVES*	RAINFED OLIVES*	IRRIGATED GRAPES*	RAINFED GRAPES*
Tradable Outputs										
- Crop produce (output) (JD)	53.43	14.03	11.74	619.50	444.12	239.32	148.25	56.58	889.06	115.36
- By-product (if any) (JD)	24.00	6.30	7.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	31.95	10.34	7.77	80.20	158.70	29.01	25.33	9.87	49.75	19.54
- Seeds/Seedlings (JD)	1.80	1.50	0.86	29.40	106.89	7.11	2.67	1.61	7.72	6.43
- Seed Transplanting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	1.93	0.43	0.98	2.14	2.27	1.21	4.60	0.00	7.50	0.00
- Phosphorus (JD)	15.67	3.81	1.23	6.81	7.22	6.04	3.55	0.00	15.65	0.00
- Potash (JD)	0.00	0.00	0.00	7.65	8.11	4.71	5.32	0.00	5.77	0.00
- Plant Protection Chemicals (JD)	1.07	0.64	0.53	26.72	21.38	6.95	2.67	2.67	6.57	6.57
- Mulch (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Machinery										
- Land Preparation (JD)	6.41	2.99	2.57	6.41	6.41	2.99	3.92	3.92	4.98	4.98
- Sowing/planting (JD)	0.80	0.64	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	1.07	0.32	0.53	1.07	6.41	0.00	2.60	1.67	1.56	1.56
- Harvesting (JD)	3.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-Tradable Inputs	287.00	9.82	9.82	299.40	304.00	167.40	152.03	28.52	275.25	39.94
- Water Requirement (JD)	245.00	0.00	0.00	175.00	196.00	105.00	88.68	0.00	193.34	0.00
- Manure (JD)	0.00	0.00	0.00	8.00	9.60	0.00	9.79	9.79	17.02	8.13
- Manual Labor										
- Land Preparation (JD)	0.40	0.00	0.00	7.20	6.80	2.80	1.27	0.86	4.57	4.57
- Sowing/Planting (JD)	0.00	0.32	0.32	5.20	5.60	1.60	0.24	0.16	1.29	1.29
- Husbandry (JD)	1.60	0.00	0.00	22.40	14.00	7.60	7.38	7.06	12.42	12.42
- Harvesting (JD)	0.00	2.00	2.00	41.60	32.00	10.40	4.67	3.16	6.61	6.03
- Capital Cost (JD)	34.44	2.26	1.99	44.46	53.26	23.20	21.27	4.61	38.99	7.03
- Land Rent (JD)	40.00	7.50	7.50	40.00	40.00	40.00	40.00	7.50	40.00	7.50

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B3. PRIVATE BUDGETS OF MAJOR CROPS GROWN IN THE NORTHERN JORDAN RIFT VALLEY (ZONE 1,JRV)

Items	CUCUMBERS I	TOMATOES I	PEPPERS I	TOMATOESIII	ONIONS IV	GREENBEANS III	EGGPLANTS III	SQUASH III	BANANAS	ORANGES
Tradable Outputs										
- Crop produce (output) (JD)	2940.00	2380.00	1850.00	493.00	402.50	397.10	295.20	259.50	425.84	474.17
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	776.60	365.39	286.04	124.29	68.90	84.91	126.70	105.01	76.72	109.45
- Seeds/Seedlings (JD)	234.00	14.25	39.00	6.92	6.00	18.00	3.33	20.00	11.27	9.39
- Seed Transplanting (JD)	9.00	8.00	19.40	8.00	0.00	0.00	10.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	20.10	20.10	20.10	7.20	6.60	6.00	7.20	6.60	24.80	19.57
- Phosphorus (JD)	32.20	31.74	31.74	10.58	8.28	9.66	10.58	9.66	5.88	19.31
- Potash (JD)	23.40	23.40	23.40	8.19	7.02	5.85	8.19	5.85	22.20	14.30
- Plant Protection Chemicals (JD)	430.00	240.00	126.00	58.00	36.00	20.00	61.00	37.50	0.00	33.44
- Mulch (JD)	20.40	20.40	20.40	20.40	0.00	20.40	20.40	20.40	0.00	0.00
- Machinery										
- Land Preparation (JD)	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	10.00	10.56
- Sowing/Planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	4.00	4.00	2.50	1.50	1.50	1.50	2.50	1.50	2.57	2.88
Non-Tradable Inputs	386.52	388.22	283.35	81.16	83.37	76.30	76.93	101.42	148.65	97.35
- Water Requirement (JD)	1.52	3.22	2.35	2.16	1.37	1.30	1.93	1.42	12.49	8.37
- Manure (JD)	48.00	48.00	16.00	16.00	0.00	16.00	16.00	17.00	39.67	13.74
- Manual Labor										
- Land Preparation (JD)	56.00	56.00	56.00	4.00	10.00	4.00	8.00	8.00	2.10	0.25
- Sowing/planting (JD)	8.00	8.00	8.00	4.00	10.00	4.00	4.00	4.00	1.04	0.25
- Husbandry (JD)	80.00	76.00	48.00	10.00	6.00	10.00	16.00	20.00	41.39	21.97
- Harvesting (JD)	124.00	128.00	84.00	22.00	10.00	18.00	8.00	28.00	5.96	6.77
- Capital Cost (JD)	27.06	27.18	19.83	5.68	5.84	5.34	5.38	7.10	10.41	6.81
- Land Rent (JD)	69.00	69.00	69.00	23.00	46.00	23.00	23.00	23.00	46.00	46.00

B4. SOCIAL BUDGETS OF MAJOR CROPS GROWN IN THE NORTHERN JORDAN RIFT VALLEY (ZONE 1,JRV)

Items	CUCUMBERS I	TOMATOES I	PEPPERS I	TOMATOESIII	ONIONS IV	GREENBEANS III	EGGPLANTS III	SQUASH III	BANANAS	ORANGES
Tradable Outputs										
- Crop produce (output) (JD)	4328.75	4122.39	3501.87	853.92	454.74	750.59	499.02	499.97	468.70	512.78
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	888.94	448.59	362.98	151.74	88.67	108.32	154.18	129.59	90.00	132.45
- Seeds/Seedlings (JD)	250.13	15.23	41.69	7.39	6.41	19.24	3.56	21.38	12.70	13.11
- Seed Transplanting (JD)	9.00	8.00	19.40	8.00	0.00	0.00	10.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	14.34	14.34	14.34	5.14	4.71	4.28	5.14	4.71	17.30	11.80
- Phosphorus (JD)	95.37	94.01	94.01	31.34	24.52	28.61	31.34	28.61	17.80	45.68
- Potash (JD)	30.64	30.64	30.64	10.72	9.19	7.66	10.72	7.66	28.50	14.53
- Plant Protection Chemicals (JD)	459.63	256.54	134.68	62.00	38.48	21.38	65.20	40.08	0.00	33.71
- Mulch (JD)	21.81	21.81	21.81	21.81	0.00	21.81	21.81	21.81	0.00	0.00
- Machinery										
- Land Preparation (JD)	3.74	3.74	3.74	3.74	3.74	3.74	3.74	3.74	11.00	11.00
- Sowing/planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	4.28	4.28	2.67	1.60	1.60	1.60	2.67	1.60	2.70	2.62
Non-Tradable Inputs	399.48	415.61	303.29	99.52	95.00	87.37	93.30	112.51	259.82	155.95
- Water Requirement (JD)	14.48	30.61	22.29	20.52	13.00	12.37	18.30	13.51	123.20	70.40
- Manure (JD)	48.00	48.00	16.00	16.00	0.00	16.00	16.00	16.00	39.90	12.25
- Manual Labor										
- Land Preparation (JD)	56.00	56.00	56.00	4.00	10.00	4.00	8.00	8.00	2.35	0.35
- Sowing/Planting (JD)	8.00	8.00	8.00	4.00	10.00	4.00	4.00	4.00	1.17	0.35
- Husbandry (JD)	80.00	76.00	48.00	10.00	6.00	10.00	16.00	20.00	41.50	20.80
- Harvesting (JD)	124.00	128.00	84.00	22.00	10.00	18.00	8.00	28.00	5.70	5.80
- Capital Cost (JD)	154.61	103.70	79.95	30.15	22.04	23.48	29.70	29.05	39.80	36.55
- Land Rent (JD)	69.00	69.00	69.00	23.00	46.00	23.00	23.00	23.00	46.00	46.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B5. PRIVATE BUDGETS OF MAJOR CROPS GROWN IN THE CENTRAL JORDAN RIFT VALLEY (ZONE 2,JRV)

Items	CUCUMBERS I	TOMATOES II	PEPPERS I	GRAPES*	POTATOES	GREENBEANS	EGGPLANT	SQUASH	BANANAS*	ORANGES*
Tradable Outputs										
- Crop produce (output) (JD)	2469.60	1360.00	1665.00	401.13	396.90	505.40	342.40	294.10	796.00	234.00
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	776.60	128.10	180.04	100.43	238.97	84.91	126.70	112.51	76.72	100.97
- Seeds/Seedlings (JD)	234.00	6.92	39.00	6.11	150.00	18.00	3.33	20.00	11.27	8.66
- Seed Transplanting (JD)	9.00	8.00	19.40	0.00	0.00	0.00	10.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	20.10	7.80	20.10	32.50	7.20	6.00	7.20	6.60	24.80	18.64
- Phosphorus (JD)	32.20	10.12	31.74	5.40	10.58	9.66	10.58	9.66	5.88	18.44
- Potash (JD)	23.40	9.36	23.40	22.13	8.19	5.85	8.19	5.85	22.20	10.87
- Plant Protection Chemicals (JD)	430.00	58.00	20.00	21.59	58.00	20.00	61.00	45.00	0.00	31.63
- Mulch (JD)	20.40	20.40	20.40	0.00	0.00	20.40	20.40	20.40	0.00	0.00
- Machinery										
- Land Preparation (JD)	3.50	3.50	3.50	10.00	3.50	3.50	3.50	3.50	10.00	10.00
- Sowing/Planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	4.00	4.00	2.50	2.70	1.50	1.50	2.50	1.50	2.57	2.73
Non-Tradable Inputs	351.55	146.75	238.18	102.66	74.10	84.80	105.52	105.20	135.95	81.64
- Water Requirement (JD)	3.55	3.15	2.58	6.45	2.10	0.80	2.32	1.80	13.87	8.88
- Manure (JD)	48.00	48.00	16.00	35.97	0.00	16.00	16.00	17.00	39.67	13.06
- Manual Labor										
- Land Preparation (JD)	56.00	8.00	56.00	0.81	4.00	4.00	8.00	8.00	2.10	0.23
- Sowing/Planting (JD)	8.00	4.00	8.00	0.39	6.00	4.00	4.00	4.00	1.04	0.23
- Husbandry (JD)	80.00	26.00	48.00	20.80	10.00	10.00	24.00	20.00	41.31	20.80
- Harvesting (JD)	124.00	25.60	75.60	6.24	20.00	18.00	19.20	22.40	5.96	6.44
- Capital Cost (JD)	78.97	19.24	29.28	14.46	21.91	11.88	16.26	15.24	15.13	13.51
- Land Rent (JD)	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B6. SOCIAL BUDGETS OF MAJOR CROPS GROWN IN THE CENTRAL JORDAN RIFT VALLEY (ZONE 2,JRV)

Items	CUCUMBERS I	TOMATOES II	PEPPERS I	GRAPES*	POTATOES	GREENBEANS	EGGPLANT	SQUASH	BANANAS*	ORANGES*
Tradable Outputs										
- Crop produce (output) (JD)	3636.15	2355.65	3151.69	768.76	405.50	955.30	665.35	504.59	882.60	256.39
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	893.19	155.58	250.20	111.87	276.19	108.71	154.74	138.17	90.20	100.66
- Seeds/Seedlings (JD)	251.56	7.43	41.93	8.60	161.26	19.35	3.58	21.50	12.70	13.11
- Seed Transplanting (JD)	9.00	8.00	19.40	0.00	0.00	0.00	10.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	14.34	5.57	14.34	23.53	5.14	4.28	5.14	4.71	17.30	11.80
- Phosphorus (JD)	95.37	29.97	94.01	16.75	31.34	28.61	31.34	28.61	17.86	17.24
- Potash (JD)	30.64	12.26	30.64	26.71	10.72	7.66	10.72	7.66	28.12	11.18
- Plant Protection Chemicals (JD)	462.27	62.35	21.50	22.68	62.35	21.50	65.58	48.38	0.00	33.71
- Mulch (JD)	21.93	21.93	21.93	0.00	0.00	21.93	21.93	21.93	0.00	0.00
- Machinery										
- Land Preparation (JD)	3.76	3.76	3.76	11.00	3.76	3.76	3.76	3.76	11.52	11.00
- Sowing/Planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	4.30	4.30	2.69	2.60	1.61	1.61	2.69	1.61	2.70	2.62
Non-Tradable Inputs	383.46	175.10	261.40	157.63	93.00	92.04	126.36	120.40	259.22	149.33
- Water Requirement (JD)	35.46	31.50	25.80	62.08	21.00	8.04	23.16	18.00	136.40	77.78
- Manure (JD)	48.00	48.00	16.00	35.35	0.00	16.00	16.00	16.00	39.95	12.25
- Manual Labor										
- Land Preparation (JD)	56.00	8.00	56.00	1.15	4.00	4.00	8.00	8.00	2.40	0.35
- Sowing/Planting (JD)	8.00	4.00	8.00	0.55	6.00	4.00	4.00	4.00	1.17	0.35
- Husbandry (JD)	80.00	26.00	48.00	20.80	10.00	10.00	24.00	20.00	41.60	20.80
- Harvesting (JD)	124.00	25.60	75.60	5.70	20.00	18.00	19.20	22.40	5.70	5.80
- Capital Cost (JD)	153.20	39.68	61.39	32.88	44.30	24.09	33.73	31.03	42.23	31.58
- Land Rent (JD)	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B7. PRIVATE BUDGETS OF MAJOR CROPS GROWN IN THE SOUTHERN JORDAN RIFT VALLEY (ZONE 3,JRV)

Items	CUCUMBERS III	TOMATOES III	PEPPERS III	GRAPES*	CANTALOUPE II	WATERMELONS	EGGPLANT	SQUASH	BANANAS*	ORANGES*
Tradable Outputs										
- Crop produce (output) (JD)	607.60	628.00	540.80	189.67	894.00	475.00	385.20	328.70	535.80	195.61
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	287.46	126.79	148.24	100.43	175.68	232.48	126.70	112.51	76.72	100.97
- Seeds/Seedlings (JD)	117.00	6.92	1.50	6.11	16.50	70.00	3.33	20.00	11.27	8.66
- Seed Transplanting (JD)	8.00	8.00	19.40	0.00	7.50	22.00	10.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	15.60	7.20	14.40	32.50	7.80	7.80	7.20	6.60	24.80	18.64
- Phosphorus (JD)	20.24	10.58	21.16	5.40	14.26	14.26	10.58	9.66	5.88	18.44
- Potash (JD)	18.72	8.19	16.38	22.13	7.02	7.02	8.19	5.85	22.20	10.87
- Plant Protection Chemicals (JD)	80.00	58.00	49.00	21.59	97.20	86.00	61.00	45.00	0.00	31.63
- Mulch (JD)	20.40	20.40	20.40	0.00	20.40	20.40	20.40	20.40	0.00	0.00
- Machinery										
- Land Preparation (JD)	3.50	3.50	3.50	10.00	3.50	3.50	3.50	3.50	10.00	10.00
- Sowing/Planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	4.00	4.00	2.50	2.70	1.50	1.50	2.50	1.50	2.57	2.73
Non-Tradable Inputs	127.10	78.60	101.02	92.05	77.48	81.48	94.91	100.05	136.97	82.78
- Water Requirement (JD)	2.10	3.60	2.42	6.84	2.48	2.48	2.71	2.05	14.89	10.02
- Manure (JD)	48.00	16.00	16.00	35.97	16.00	20.00	16.00	17.00	39.67	13.06
- Manual Labor										
- Land Preparation (JD)	8.00	4.00	8.00	0.81	8.00	8.00	8.00	8.00	2.10	0.23
- Sowing/Planting (JD)	4.00	4.00	8.00	0.39	4.00	4.00	4.00	4.00	1.04	0.23
- Husbandry (JD)	22.00	10.00	20.00	20.80	16.00	16.00	24.00	20.00	41.31	20.80
- Harvesting (JD)	22.00	20.00	25.60	6.24	10.00	10.00	19.20	28.00	5.96	6.44
- Capital Cost (JD)	29.02	14.38	17.45	15.86	17.72	21.98	15.51	14.88	14.57	12.96
- Land Rent (JD)	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	32.00	32.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B8. SOCIAL BUDGETS OF MAJOR CROPS GROWN IN THE SOUTHERN JORDAN RIFT VALLEY (ZONE 3,JRV)

Items	CUCUMBERS III	TOMATOES III	PEPPERS III	GRAPES*	CANTALOUPE II	WATERMELONS	EGGPLANT	SQUASH	BANANAS*	ORANGES*
Tradable Outputs										
- Crop produce (output) (JD)	894.61	1177.83	1120.60	365.04	861.37	487.01	748.52	633.30	593.60	214.30
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	345.37	154.98	196.47	109.69	214.04	274.01	154.74	138.17	89.59	103.28
- Seeds/Seedlings (JD)	125.78	7.43	1.61	8.60	17.74	75.25	3.58	21.50	12.72	13.11
- Seed transplanting (JD)	8.00	8.00	19.40	0.00	7.50	22.00	10.00	0.00	0.00	0.00
- Chemical Fertilizer										
- Nitrogen (JD)	11.13	5.14	10.27	23.53	5.57	5.57	5.14	4.71	17.30	11.80
- Phosphorus (JD)	59.95	31.34	62.67	16.75	42.24	42.24	31.34	28.61	17.85	17.24
- Potash (JD)	24.51	10.72	21.45	26.71	9.19	9.19	10.72	7.66	28.12	11.18
- Plant Protection Chemicals (JD)	86.00	62.35	52.68	20.80	104.50	92.45	65.58	48.38	0.00	33.71
- Mulch (JD)	21.93	21.93	21.93	0.00	21.93	21.93	21.93	21.93	0.00	0.00
- Machinery										
- Land Preparation (JD)	3.76	3.76	3.76	10.70	3.76	3.76	3.76	3.76	11.00	13.62
- Sowing/planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	4.30	4.30	2.69	2.60	1.61	1.61	2.69	1.61	2.60	2.62
Non-Tradable Inputs	146.00	111.00	122.84	150.33	99.78	103.78	119.26	117.46	258.12	150.25
- Water Requirement (JD)	21.00	36.00	24.24	65.78	24.78	24.78	27.06	20.46	146.40	89.70
- Manure (JD)	48.00	16.00	16.00	35.35	16.00	20.00	16.00	16.00	39.90	12.25
- Manual Labor										
- Land Preparation (JD)	8.00	4.00	8.00	1.15	8.00	8.00	8.00	8.00	2.35	0.35
- Sowing/planting (JD)	4.00	4.00	8.00	0.55	4.00	4.00	4.00	4.00	1.17	0.35
- Husbandry (JD)	22.00	10.00	20.00	20.80	16.00	16.00	24.00	20.00	41.60	20.80
- Harvesting (JD)	22.00	20.00	25.60	5.70	10.00	10.00	19.20	28.00	5.70	5.80
- Capital Cost (JD)	58.96	31.92	38.32	35.17	37.66	45.33	32.88	30.68	42.35	31.89
- Land Rent (JD)	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B9. PRIVATE BUDGETS OF MAJOR CROPS GROWN IN THE GHOR SAFI AND WADI ARABA, JORDAN RIFT VALLEY (ZONE4, JRV)

Items	CANTALOUPE III	SPRING TOMATOES III	WATERMELON II	AUTUMN TOMATOES III	GRAPES*	GREENBEANS III	AUTUMN EGGPLANT III
Tradable Outputs							
- Crop produce (output) (JD)	238.40	408.20	575.00	439.60	345.90	502.60	214.00
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	175.42	88.79	229.42	86.29	99.78	84.91	83.70
- Seeds/Seedlings (JD)	16.50	6.92	70.00	6.92	6.11	18.00	3.33
- Seed Transplanting (JD)	7.50	8.00	8.00	8.00	0.00	0.00	8.00
- Chemical Fertilizer							
- Nitrogen (JD)	7.65	7.20	7.65	7.20	31.40	6.00	7.20
- Phosphorus (JD)	14.15	10.58	14.15	10.58	5.28	9.66	10.58
- Potash (JD)	7.02	8.19	7.02	8.19	22.70	5.85	8.19
- Plant Protection Chemicals (JD)	97.20	20.00	97.20	20.00	21.59	20.00	20.00
- Mulch (JD)	20.40	20.40	20.40	20.40	0.00	20.40	20.40
- Machinery							
- Land Preparation (JD)	3.50	3.50	3.50	3.50	10.00	3.50	3.50
- Sowing/Planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	1.50	4.00	1.50	1.50	2.70	1.50	2.50
Non-Tradable Inputs	95.33	100.74	95.33	101.04	112.90	96.78	120.64
- Water Requirement (JD)	2.33	3.74	2.33	4.04	7.69	3.78	3.64
- Manure (JD)	16.00	16.00	16.00	16.00	35.97	16.00	16.00
- Manual Labor							
- Land Preparation (JD)	8.00	4.00	8.00	4.00	0.81	4.00	8.00
- Sowing/Planting (JD)	4.00	4.00	4.00	4.00	0.39	4.00	4.00
- Husbandry (JD)	16.00	10.00	16.00	10.00	20.80	10.00	24.00
- Harvesting (JD)	8.00	22.00	8.00	22.00	6.24	18.00	24.00
- Capital Cost (JD)	18.95	13.27	22.73	13.11	15.44	12.72	14.30
- Land Rent (JD)	41.00	41.00	41.00	41.00	41.00	41.00	41.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

B10. SOCIAL BUDGETS OF MAJOR CROPS GROWN IN THE GHOR SAFI AND WADI ARABA, JORDAN RIFT VALLEY (ZONE4, JRV)

Items	CANTALOUPE III	SPRING TOMATOES III	WATERMELON II	AUTUMN TOMATOES III	GRAPES*	GREENBEANS III	AUTUMN EGGPLANT III
Tradable Outputs							
- Crop produce (output) (JD)	229.70	765.59	589.54	824.48	685.67	955.30	415.85
- By-product (if any) (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tradable Inputs	212.73	111.12	270.42	111.12	111.93	86.52	85.48
- Seeds/Seedlings (JD)	17.64	7.39	74.82	7.39	8.60	19.24	3.56
- Seed transplanting (JD)	7.50	8.00	8.00	8.00	0.00	0.00	8.00
- Chemical Fertilizer							
- Nitrogen (JD)	5.46	5.14	5.46	5.14	22.58	4.28	5.14
- Phosphorus (JD)	41.90	31.34	41.90	31.34	16.25	28.61	31.34
- Potash (JD)	9.19	10.72	9.19	10.72	27.78	7.66	10.72
- Plant Protection Chemicals (JD)	103.90	21.38	103.90	21.38	23.09	21.38	21.38
- Mulch (JD)	21.81	21.81	21.81	21.81	0.00	0.00	0.00
- Machinery							
- Land Preparation (JD)	3.74	3.74	3.74	3.74	11.00	3.74	3.74
- Sowing/planting (JD)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- Husbandry (JD)	1.60	1.60	1.60	1.60	2.63	1.60	1.60
Non-Tradable Inputs	116.34	134.38	116.34	137.38	178.87	130.80	153.36
- Water Requirement (JD)	23.34	37.38	23.34	40.38	74.04	37.80	36.36
- Manure (JD)	16.00	16.00	16.00	16.00	35.35	16.00	16.00
- Manual Labor							
- Land Preparation (JD)	8.00	4.00	8.00	4.00	1.15	4.00	8.00
- Sowing/planting (JD)	4.00	4.00	4.00	4.00	0.55	4.00	4.00
- Husbandry (JD)	16.00	10.00	16.00	10.00	20.80	10.00	24.00
- Harvesting (JD)	8.00	22.00	8.00	22.00	5.98	18.00	24.00
- Capital Cost (JD)	39.49	29.46	46.41	29.82	36.81	26.08	28.66
- Land Rent (JD)	41.00	41.00	41.00	41.00	41.00	41.00	41.00

* Figures in fruit trees budgets are derived by a discounting method in which the future sum is discounted back to the present to find its annual equivalent present value.

ANNEX C

C1. POLICY ANALYSIS MATRICES (PAMS) OF MAJOR CROPS GROWN IN THE HIGHLANDS

A POLICY ANALYSIS MATRIX FOR IRRIGATED WHEAT IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	82.80	22.92	39.91	19.97
Social Prices	77.43	35.78	321.44	-279.79
Effects of Divergences & Policy	5.37	-12.87	-281.53	299.76

A POLICY ANALYSIS MATRIX FOR RAINFED WHEAT IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	22.05	8.12	10.51	3.42
Social Prices	20.33	11.58	11.00	-2.25
Effects of Divergences & Policy	1.72	-3.46	-0.49	5.67

A POLICY ANALYSIS MATRIX FOR RAINFED BARLEY IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	19.20	7.48	10.51	1.21
Social Prices	18.94	8.70	11.00	-0.76
Effects of Divergences & Policy	0.26	-1.22	-0.49	1.97

A POLICY ANALYSIS MATRIX FOR TOMATOES IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	632.75	75.60	322.50	234.66
Social Prices	619.50	89.83	335.33	194.34
Effects of Divergences & Policy	13.25	-14.23	-12.83	40.31

A POLICY ANALYSIS MATRIX FOR POTATOES IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	710.70	153.89	327.85	228.97
Social Prices	444.12	177.74	340.48	-74.10
Effects of Divergences & Policy	266.58	-23.85	-12.63	303.07

C1. (Continued)

A POLICY ANALYSIS MATRIX FOR WATERMELON IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	154.10	24.92	179.12	-49.94
Social Prices	239.32	32.50	187.49	19.33
Effects of Divergences & Policy	-85.22	-7.57	-8.37	-69.27

A POLICY ANALYSIS MATRIX FOR IRRIGATED OLIVES IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	166.25	25.28	84.70	56.26
Social Prices	148.25	28.37	170.27	-50.39
Effects of Divergences & Policy	18.00	-3.09	-85.57	106.66

A POLICY ANALYSIS MATRIX FOR RAINFED OLIVES IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	61.43	9.92	33.07	18.44
Social Prices	56.58	11.05	31.94	13.58
Effects of Divergences & Policy	4.86	-1.14	1.13	4.86

A POLICY ANALYSIS MATRIX FOR IRRIGATED GRAPES IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	876.90	44.19	114.74	717.97
Social Prices	889.06	55.72	308.28	525.06
Effects of Divergences & Policy	-12.16	-11.53	-193.54	192.91

A POLICY ANALYSIS MATRIX FOR RAINFED GRAPES IN THE HIGHLANDS

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	112.90	20.00	45.08	47.82
Social Prices	115.36	21.88	44.73	48.74
Effects of Divergences & Policy	-2.46	-1.89	0.35	-0.92

C2. POLICY ANALYSIS MATRICES (PAMSs) OF MAJOR CROPS GROWN IN THE NORTHERN JORDAN RIFT VALLEY (ZONE 1, JRV)

A POLICY ANALYSIS MATRIX FOR CUCUMBER (PLASTIC HOUSES) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	2940.00	830.96	413.58	1695.46
Social Prices	4328.75	995.61	447.42	2885.72
Effects of Divergences & Policy	-1388.75	-164.65	-33.83	-1190.27

A POLICY ANALYSIS MATRIX FOR TOMATOES (PLASTIC HOUSES) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	2380.00	390.97	415.40	1575.45
Social Prices	4122.39	502.42	465.48	3154.49
Effects of Divergences & Policy	-1742.39	-111.45	-51.90	-1579.03

A POLICY ANALYSIS MATRIX FOR PEPPERS (PLASTIC HOUSES) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	1850.00	306.06	303.18	1240.76
Social Prices	3501.87	406.54	339.68	2755.65
Effects of Divergences & Policy	-1651.87	-100.48	-36.50	-1514.89

A POLICY ANALYSIS MATRIX FOR TOMATOES (OPEN FIELD) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	493.00	132.98	86.84	273.17
Social Prices	853.92	169.95	111.46	572.51
Effects of Divergences & Policy	-360.92	-36.96	-24.62	-299.34

A POLICY ANALYSIS MATRIX FOR ONIONS IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	402.50	73.72	89.20	239.57
Social Prices	454.74	99.31	106.40	249.04
Effects of Divergences & Policy	-52.24	-25.58	-17.19	-9.46

A POLICY ANALYSIS MATRIX FOR GREENBEANS (OPEN FIELD) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	397.10	90.85	81.64	224.60
Social Prices	750.59	121.32	97.85	531.42
Effects of Divergences & Policy	-353.49	-30.47	-16.21	-306.81

A POLICY ANALYSIS MATRIX FOR EGGPLANTS (OPEN FIELD) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	295.20	135.57	82.31	77.32
Social Prices	499.02	172.68	104.49	221.84
Effects of Divergences & Policy	-203.82	-37.11	-22.18	-144.52

A POLICY ANALYSIS MATRIX FOR SQUASH (OPEN FIELD) IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	259.50	112.36	108.52	38.62
Social Prices	499.97	145.15	126.01	228.82
Effects of Divergences & Policy	-240.47	-32.79	-17.49	-190.20

A POLICY ANALYSIS MATRIX FOR BANANAS IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	425.84	82.09	159.06	184.69
Social Prices	468.70	100.80	291.00	76.90
Effects of Divergences & Policy	-42.86	-18.71	-131.94	107.79

A POLICY ANALYSIS MATRIX FOR ORANGES IN ZONE 1, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	474.17	117.11	104.16	252.89
Social Prices	512.78	148.34	174.66	189.77
Effects of Divergences & Policy	-38.61	-31.23	-70.50	63.12

C3. POLICY ANALYSIS MATRICES (PAMSs) OF MAJOR CROPS GROWN IN THE CENTRAL JORDAN RIFT VALLEY (ZONE 2, JRV)

A POLICY ANALYSIS MATRIX FOR CUCUMBER (PLASTIC HOUSES) IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	2469.60	830.96	376.15	1262.48
Social Prices	3636.15	1000.37	429.48	2206.30
Effects of Divergences & Policy	-1166.55	-169.41	-53.32	-943.82

A POLICY ANALYSIS MATRIX FOR TOMATOES (OPEN FIELD) IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	1360.00	137.06	157.02	1065.92
Social Prices	2355.65	174.25	196.11	1985.29
Effects of Divergences & Policy	-995.65	-37.19	-39.09	-919.37

A POLICY ANALYSIS MATRIX FOR PEPPERS (PLASTIC HOUSES) IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	1665.00	192.64	254.85	1217.50
Social Prices	3151.69	280.23	292.77	2578.69
Effects of Divergences & Policy	-1486.69	-87.59	-37.92	-1361.18

A POLICY ANALYSIS MATRIX FOR GRAPES IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	401.13	107.46	109.85	183.82
Social Prices	768.76	125.29	176.55	466.92
Effects of Divergences & Policy	-367.63	-17.83	-66.70	-283.10

A POLICY ANALYSIS MATRIX FOR POTATOES IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	396.90	255.70	79.29	61.92
Social Prices	405.50	309.33	104.16	-7.99
Effects of Divergences & Policy	-8.60	-53.63	-24.87	69.90

C3. (Continued)

A POLICY ANALYSIS MATRIX FOR GREENBEANS (OPEN FIELD) IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	505.40	90.85	90.74	323.81
Social Prices	955.30	121.76	103.08	730.46
Effects of Divergences & Policy	-449.90	-30.90	-12.34	-406.65

A POLICY ANALYSIS MATRIX FOR EGGPLANTS (OPEN FIELD) IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	342.40	135.57	112.90	93.93
Social Prices	665.35	173.31	141.52	350.52
Effects of Divergences & Policy	-322.95	-37.74	-28.62	-256.59

A POLICY ANALYSIS MATRIX FOR SQUASH (OPEN FIELD) IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	294.10	120.39	112.56	61.15
Social Prices	504.59	154.75	134.85	214.99
Effects of Divergences & Policy	-210.49	-34.36	-22.28	-153.84

A POLICY ANALYSIS MATRIX FOR BANANAS IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	796.00	82.09	145.47	568.44
Social Prices	882.60	101.02	290.33	491.25
Effects of Divergences & Policy	-86.60	-18.93	-144.86	77.19

A POLICY ANALYSIS MATRIX FOR ORANGES IN ZONE 2, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	234.00	108.04	87.35	38.61
Social Prices	256.39	112.74	167.25	-23.60
Effects of Divergences & Policy	-22.39	-4.70	-79.89	62.21

C4. POLICY ANALYSIS MATRICES (PAMSs) OF MAJOR CROPS GROWN IN THE SOUTHERN JORDAN RIFT VALLEY (ZONE 3, JRV)

A POLICY ANALYSIS MATRIX FOR CUCUMBER (OPEN FIELD) IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	607.60	307.58	136.00	164.02
Social Prices	894.61	386.82	163.52	344.27
Effects of Divergences & Policy	-287.01	-79.24	-27.52	-180.25

A POLICY ANALYSIS MATRIX FOR TOMATOES (OPEN FIELD) IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	628.00	135.66	84.10	408.24
Social Prices	1177.83	173.58	124.32	879.93
Effects of Divergences & Policy	-549.83	-37.92	-40.22	-471.69

A POLICY ANALYSIS MATRIX FOR PEPPERS (OPEN FIELD) IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	540.80	158.62	108.10	274.09
Social Prices	1120.60	220.05	137.58	762.97
Effects of Divergences & Policy	-579.80	-61.43	-29.49	-488.89

A POLICY ANALYSIS MATRIX FOR GRAPES IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	189.67	107.46	98.49	-16.28
Social Prices	365.04	122.85	168.37	73.82
Effects of Divergences & Policy	-175.37	-15.39	-69.87	-90.10

A POLICY ANALYSIS MATRIX FOR CANTALOUPE (PLASTIC TUNNEL) IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	894.00	187.98	82.90	623.12
Social Prices	861.37	239.72	111.75	509.90
Effects of Divergences & Policy	32.63	-51.74	-28.85	113.22

C4. (Continued)

A POLICY ANALYSIS MATRIX FOR WATERMELON (OPEN FIELD) IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	475.00	248.75	87.18	139.06
Social Prices	487.01	306.89	116.23	63.89
Effects of Divergences & Policy	-12.01	-58.14	-29.05	75.18

A POLICY ANALYSIS MATRIX FOR EGGPLANTS (OPEN FIELD) IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	385.20	135.57	101.55	148.08
Social Prices	748.52	173.31	133.57	441.64
Effects of Divergences & Policy	-363.32	-37.74	-32.02	-293.56

A POLICY ANALYSIS MATRIX FOR SQUASH (OPEN FIELD) IN ZONE 3, JRV.

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	328.70	120.39	107.05	101.27
Social Prices	633.30	154.75	131.56	347.00
Effects of Divergences & Policy	-304.60	-34.36	-24.51	-245.73

A POLICY ANALYSIS MATRIX FOR BANANAS IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	535.80	82.09	146.56	307.15
Social Prices	593.60	100.34	289.09	204.16
Effects of Divergences & Policy	-57.80	-18.25	-142.54	102.99

A POLICY ANALYSIS MATRIX FOR ORANGES IN ZONE 3, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	195.61	108.04	88.57	-1.00
Social Prices	214.30	115.67	168.28	-69.66
Effects of Divergences & Policy	-18.69	-7.64	-79.70	68.65

C5. POLICY ANALYSIS MATRICES (PAMSs) OF MAJOR CROPS GROWN IN THE GHOR SAFI AND WADI ARABA, JORDAN RIFT VALLEY (ZONE 4,JRV)

A POLICY ANALYSIS MATRIX FOR CANTALOUPE (OPEN FIELD) IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	238.40	187.69	102.01	-51.30
Social Prices	229.70	238.26	130.30	-138.86
Effects of Divergences & Policy	8.70	-50.57	-28.29	87.56

A POLICY ANALYSIS MATRIX FOR SPRING TOMATOES (OPEN FIELD) IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	408.20	95.00	107.79	205.41
Social Prices	765.59	124.45	150.51	490.63
Effects of Divergences & Policy	-357.39	-29.45	-42.72	-285.22

A POLICY ANALYSIS MATRIX FOR WATERMELON (OPEN FIELD) IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	575.00	245.47	102.01	227.52
Social Prices	589.54	302.87	130.30	156.37
Effects of Divergences & Policy	-14.54	-57.40	-28.29	71.15

A POLICY ANALYSIS MATRIX FOR AUTUMN TOMATOES (OPEN FIELD) IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	439.60	92.32	108.11	239.16
Social Prices	824.48	124.45	153.87	546.16
Effects of Divergences & Policy	-384.88	-32.13	-45.75	-306.99

A POLICY ANALYSIS MATRIX FOR GRAPES IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	345.90	106.76	120.80	118.33
Social Prices	685.67	125.36	200.33	359.98
Effects of Divergences & Policy	-339.77	-18.60	-79.53	-241.64

C5. (Continued)

A POLICY ANALYSIS MATRIX FOR GREENBEANS (OPEN FIELD) IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	502.60	90.85	103.55	308.19
Social Prices	955.30	96.90	146.50	711.90
Effects of Divergences & Policy	-452.70	-6.05	-42.94	-403.71

A POLICY ANALYSIS MATRIX FOR AUTUMN EGGPLANTS (OPEN FIELD) IN ZONE 4, JRV

Items	Revenues	Cost of Tradable inputs	Cost of Domestic factors	Profits
Private Prices	214.00	89.56	129.08	-4.64
Social Prices	415.85	95.74	171.76	148.34
Effects of Divergences & Policy	-201.85	-6.18	-42.68	-152.98

BIBLIOGRAPHY

Abt Association et al. *"The Contribution of Agribusiness to National Income and Employment in Jordan."* APAP II Technical Report. No. 131, Prepared for USAID/Amman, June 1993.

Agricultural Credit Corporation. Handbook of Agricultural Costs." (Amman, Jordan) 1994.

Bani-Hani, M. *"Irrigated Agriculture in Jordan"*, in "Jordan's Water Resources and Their Future Potential." Proceedings of the Symposium 27th and 28th October 1991. Amman, Jordan. 1992.

Belbisi, M. *"Jordan's Water Resources and the Expected Domestic Demand by the years 2000 and 2010: Detailed According to Area"*, in " Jordan's Water Resources and Their Future Potential." Proceedings of the Symposium 27th and 28th October 1991. Amman, Jordan. 1992.

ESCWA & FAO. *"The impact of the Structural Adjustment Programme on Food Production, Supply and Consumption in Jordan"*, United Nations. 1995.

Food and Agriculture Organization of the United Nations. "Comparative Advantage of Agricultural Production Systems and Its Policy Implications in Pakistan." FAO Economic and Social Development Paper (68), (Rome, 1987).

Government of Jordan. Department of Statistics (DOS). External Trade Books for the years 1992, 1993, and 1994.

Harrison, K. M. and A. Jabbarin. *"Evaluation of the Economic Benefits of Horticultural Exports to Europe."* Sigma One Corporation. August 1991.

IBRD. World Bank Comparative Studies. The Political Economy of Agricultural Pricing Policy, "Trade, Exchange Rate, and Agricultural Pricing Policies in Pakistan." (Washington, D.C., USA). 1990.

Ministry of Agriculture. *"National Agricultural Research Strategy."* Amman, Jordan. 1994.

Monke, Eric A. and Scott R. Pearson, The Policy Analysis Matrix for Agricultural Development. Cornell University Press (Ithaca, New York, USA, 1989).

Naylor, R. and C. Gotsch. "Agricultural Policy Analysis Course-Computer Exercises." Food Research Institute. Stanford University. Palo Alto, CA, USA (July 1989).

Office for Integrated Agricultural Development (OIAD). "Study on the Future Adjustment of Agricultural Production Systems in the Jordan Rift Valley." 1995. Amman, Jordan.

Quezada, N. A. and L. C. Brown. *"Evaluation of the Impact of Price Regulation on Fruit and Vegetable Marketing in Jordan."* Agricultural Marketing Organization. February 1990.

The Central Bank of Jordan. *"Annual Report - 1995."* vol. 32.

The World Bank. *"Agriculture Sector Adjustment Loan"* Draft Initiating Memorandum. February, 1994.

Tsakok, Isabelle. Agricultural Price Policy - A Practitioner's Guide to Partial-Equilibrium Analysis. Cornell Press, Ithaca, NY, USA. 1990.

United Nations Economic and Social Commission for Western Asia. "National Farm Data Handbook-Jordan." Amman, 1993.