Assistance for Capacity Building Through Enhancing Operation of the National Agricultural Policy Center
FAO Projects GCP/SYR/006/ITA and TCP/SYR/2906 (A)

Comparative advantages Study
Final Technical Report

Frédéric Lançon

Centre de coopération internationale en recherche agronomique pour le développement. (CIRAD)
Annual Crop Department
Ave Agropolis
34398 Montpellier Cedex 5
France

April 2005

Table of contents

DK=526705.

1. Objectives and scope.

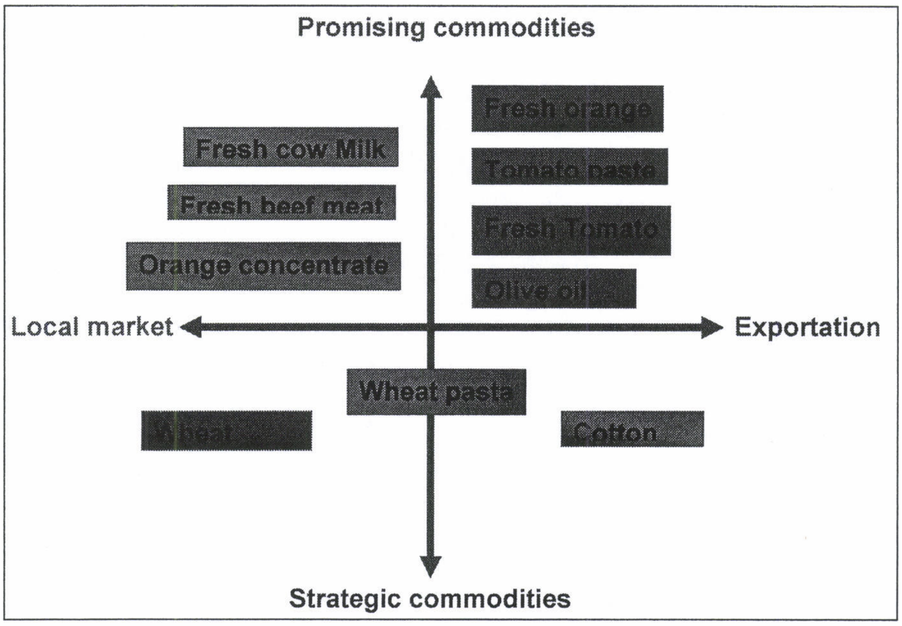
This report presents the outcome of a study carried out from September 2003 to May 2004 by the National Agricultural Policy Centre with the assistance of the Food and Agricultural Organization of the United Nations under Projects GCP/SYR/006/ITA and TCP/SYR 2906(A) on the comparative advantages of selected commodity chains. The study assesses the impact of the structural changes, that are taking place in the Syrian economy since the early 90's, on the economic viability of these commodity chains. With the gradual shift from a centrally planned to a market driven economy, combined with an increasing opening to the world economy, and the corresponding increasing competition between local and foreign sources of supply for food supply, the capacity of the Syrian agriculture to remain competitive in a new policy environment is a crucial issue for policy formulation. Conversely, it is equally important for policy makers to identify commodity chains that can benefit from new market opportunities created by trade liberalization, and thus, durably increase their contribution to country's economic growth.

Historically food security is considered as the core function devoted to the agricultural sector to maintain the stable social environment required by the country global development strategy. Beyond the steady supply of staple food to the population at affordable price, the agricultural sector is also considered as a key element of the industrialization strategy through the provision of raw material to the agro-food industry that has acknowledged a rapid development of private investment in the past decade under the impulsion of the Law 10 framework. This downward linkage is also a key element in the expected increasing contribution of agro-food products with higher value added content to exportation and currency earning. Concurrently, agriculture is also expected to play a crucial role in counter-balancing the rural-urban increasing social and economic unequal development engendered by the economic growth, through the provision of jobs and income opportunities to a rural population that still represent the largest share of the population. Last, but not least, with the rapid extension of irrigated production that was key for agricultural output growth in the past 15 years, an optimal utilization of natural resources, and water in particular, has become a major element in the formulation of the Syrian Agricultural policies.

In the past decades, the Syrian government pursues simultaneously most of these objectives through output/input prices control and through the allocation of financial support to selected commodity chains or groups of agents such as producers or processing industries. This transfer of resources from the whole economy to agriculture was facilitated by the availability of revenue generated by oil exports, a policy that would be less and less feasible in the mid-term with the expected decrease of oil surplus exports. Concurrently, the gradual liberalization of the Syrian economy materialized in the GGAFTA membership, the Association Agreement with EU and the application for WTO membership mean that direct public intervention in the agricultural sector would become more an exception than the normal policy option for promoting the development of the Syrian agriculture

The study assessed the comparative advantages of six major agricultural commodity systems or subsectors: cotton, wheat, olive oil, tomato, orange and cattle. The number of commodity selected was limited in order to fit with the available human resources and timeframe and to ensure that the capacity building component embedded in project can be properly implemented. With the expertise acquired during this first Comparative advantages Study (CAS) NAPC is in a position to further expand the assessment of comparative advantagess of Syrian agriculture by analyzing the additional commodities.

Figure 1: Clusters of selected final output.



Commodities have been selected by the NAPC in consultation with members of the Ministerial Price Committee in order to provide a first set of information for policy making. They have been selected on the basis of their economic importance and of their representativeness of the different functions that the agricultural sector is expected to fulfill within the Syrian Economic development. A first level of discrimination was retained between "strategic commodities" that have been the pillar or the Syrian agricultural development such as cotton, wheat and olive oil and "promising commodities" such as tomato, oranges or cattle that have acknowledged a rapid expansion in the last decade triggered by an increasing domestic demand. This initial set of raw commodity was then further differentiated on the basis of the different final output produced by the Syrian agro-industries in order to capture downward linkages and the different targeted market (domestic market or exports). Accordingly, the study focused on the production of cotton lint, wheat flour and wheat pasta, filtered olive oil[1], packed fresh tomatoes, packed fresh oranges,

[1] In this study, "olive oil" or "filtered olive oil" are used as synonyms to refer to virgin olive oil that, according to the Syrian standard, is characterized by a level of acidity comprised between 0.8-2%, peroxide 20 meq/Kg (milligrams equivalent oxygen per kilogram), moisture below 80%, and a ratio of residuals not exceeding 0.1%. Reportedly, about 90% of total Syrian exports fall in this category. It should also be noticed that exported olive oil is normally filtrated to minimize residuals, while unfiltered olive oil is normally preferred by the domestic consumers.

Fresh Orange Juice Concentrate (FOJC), beef meat and packed fresh milk. In terms of comparative advantages analysis it is therefore possible to further differentiate the initial group of commodity on the basis or their final outputs between final output that mainly target the local or domestic market as substitute to import and final outputs that are exported. Figure 1 presents the different clusters of agro-food product retained in the study with respect to these two levels of classification.

The results presented in this report aim at assisting policy analysts in assessing policy options and substantiate priorities on a commodity basis with respect to the whole range of functions devoted to the agricultural sector, balancing between economic efficiency and social equity. The following Section 2 presents the method applied to measure the comparative advantages, the sources of information used and the process through which they were collected and analyzed. Section 3 presents the results obtained, while Section 4 addresses more specifically the policy implications of the study.

2. Method and data analysis.

2.1. The Policy Analysis Matrix

2.1.1. The conceptual framework

The assessment of the comparative advantagess of a given productive system, or a subsector, producing a given good or services, encompasses a broad range of conceptual works emanating from cost-benefit analysis and the theory of international trade. The concept of comparative advantages basically considers if a country should produce a good with its own domestic resources (labor, capital, land) to supply its population, and possibly to export, or if it is more economically efficient to import this good and to allocate the spared domestic resources to the production of other goods for which the country has a comparative advantages. This conceptual framework implies that the best allocation of domestic resources is the one achieved in an open trade and competitive environment.

In practice, the comparative advantages of a productive system are measured through the computation of several accounting entities and ratios that have been gradually developed through applied research. In the eighties these computations have been consolidated into one analytical framework, named the Policy Analysis Matrix (PAM). This analytical framework has been widely used to assist in decision making by monitoring trade liberalization process especially in European, South-East Asian and Sub-Saharan countries from the eighties onward.

The distinction between tradable goods and domestic factors is at the core of the conceptual framework. Tradables are goods and services that can be internationally traded and include both intermediate inputs required during the process of production, and the final output of the production process. It should be emphasized that tradables include any inputs and outputs goods even if they are not actually internationally traded. The second category of costs are the domestic factors which include basically labor and capital required to produce the final output, even though, labor and capital cannot be any more considered as "pure" domestic factors in a globalized world where international migrations are frequent and where financial markets are increasingly integrated. However it is considered that the price or the value of domestic factors is mainly determined by local factor markets conditions, especially for labor.

This concept of "domestic factor" is central to the theory of the comparative advantagess as they correspond to the resources available from which goods can be produce within the national economy. Since there is a limited quantity of domestic factors available, their optimal allocation and combination are crucial to ensure the maximum level of efficiency. The profit generated by a selected system is measured by subtracting tradable inputs and domestic factors values from total tradable output value. Considering that the total output sale is the revenue of the system, this accounting identity can be noted as: Revenue = Tradable input + Domestics Factors + Profit.

This accounting identity is computed using two price systems. The first line of the PAM contains the value for this accounting identity measured at private prices, which are the price currently used by the different agents to purchase their inputs and domestic factors and sell their outputs (Figure 2).

Figure 2: 1st row of the PAM

Private price:	Revenue	=	Tr I.	+	Dom. F	+	Profit

The second row of the PAM gives the value of the same identity when it is measured at social prices. Social prices are the prices that would prevail if the value of tradables (outputs and inputs) and domestic factors were not modified either by the economic policy in place (through tax, subsidy, price intervention) or by markets market imperfections (market segmentation, missing market) resulting in price levels that do not reflect the true scarcity of outputs, inputs and production factors. In short the second row of the PAM can be seen as a "benchmark" that will be used to asses the economic efficiency of the system (Figure 3).

Figure 3 2nd row of the PAM

Social price:	Revenue	=	Tr .I	+	Dom. F	+	(-)

Consequently, the third row of the PAMS obtained by subtracting the social values from the private values indicates the magnitude of the transfers induced by the current policy and market environment between the prevailing situation at private price and the optimal one at social price (Figure 4).

Figure 4 Computation the 3rd row of the PAM

Private price:		Revenue	=	Tr I.	+	Dom. F	+	Profit
	-							
Social price:		Revenue	=	Tr .I	+	Dom. F	+	(-)
	=							
Divergences:		Tax	=	(- Sub)	+		+	Net transfer

It is worth noting that the concept of "transfers" is not limited to the actual release of funds to the subsector under the form of public subsidies but also include "implicit subsidies" resulting from policy measures or market imperfections that modify input or output price levels (i.e. a ban on the importation of a given output resulting in a high price on the local market for this output). Further more, these transfers can be both positive (in favor of the system analyzed) or negative, when economic agents of a selected system will have to pay a higher price for purchasing a tradable input due to high level of taxation applied to import it.

The PAM, a three-lines by three-column table, is build on the bases of these accounting identities and provide all the different accounting values needed (noted from A to L)to compute the ratios required for the analysis of the comparative advantages (Table 1).

Table 1 The Policy Analysis Matrix

	Revenues	Trad. Inp.	Domestic Fac	Profit
Market prices	A	B	C	D
Social prices	E	F	G	H
Divergences	I	J	K	L

2.1.2. *Indicators of comparative advantages*

The PAM provides straightforwardly a range of indicators for assessing the comparative advantages of a productive system. If D is positive the system generates profit under the current policy and market conditions and is said to be competitive or profitable.

Similarly, if H is positive the system is able to generate profit without benefiting from any transfer from the rest of the economic systems, or conversely transferring resources to the rest of the economy; in this case the system is said to be economically efficient or to have a comparative advantages.

The computation of a PAM for one specific system provides only a limited set of information for policy formulation that requires choosing between different alternatives. It is, therefore, much more relevant to build a PAM for different technical combinations of inputs and domestics factors or for different category of outputs or for different period of reference to analyze changes across time.

The comparison of PAMs, developed for different technologies or different products, relies on the computation of ratios that are scale, product and time independent in order to derive meaningful comparison. Different types of ratio have been developed that provide indication on the different dimension of the comparative advantages.

Ratio of profitability and economic efficiency.

- The Financial Cost Benefit ratio (FCB), is the value of the domestic factors above the value added[2] created at market price [FBC= C/ (A-B)]. If this ratio is above one, it means that the systems utilize more value of Domestic factors than it the wealth created or the Value Added, then the system is not profitable. If the FCB<1, the system is profitable; therefore the system that are the most profitable are the one that have the FCB closest to zero.

- The Domestic Cost Resources ratio (DRC) is a ratio similar to the FCB but computed at social prices. It measures the level of comparative advantagess achieved by the selected systems [DRC=G/(E-F)] . If the DRC is above one, the system has no comparative advantages, meaning that the production of one unit of output will mobilize more domestic resources than value added created. If the DRC is below one the system has a comparative advantages, and the system is said to be economically efficient.

- The Social Cost Benefit (SCB) ratio is another indicator of the level of comparative advantages. It is computed by dividing the sum of the tradable input and the domestic factor on the revenue [(F+G)/E] at social prices. It is interpreted like the DRC, i.e. a SCB above one indicate that the selected system does not have a comparative advantages. The SCB is consistent with the DRC in the sense that a given systems with a DRC >1 will necessary have a SCB> 1. The SCB has been developed as an alternative to the DRC because it is demonstrated that for ranking the comparative advantages of different systems, the DRC is biased in favor of activities that have a relative higher content in tradable input than domestic factors (W.A. Master 2003).

Ratio of price distortions and transfers.

- The Nominal Protection Coefficient (NPC) measure the level of protection for the tradable output by looking at the ratio of the revenue at private price above the revenue at social price (NPC= A/E). A NPC above one indicates that the system benefit from a protection since he get a higher revenue at private prices than he would get at social price; conversely, a NPC below one indicates that the main output in undervalued at private price resulting in a transfer of wealth from the productive system to the rest of the economy.

- The Effective Protection Coefficient ratio (EPC) compares the added value at private price to added value at social price [EPC= (A-B) / (E-F)] which give a combined index of the level of trade distortion on both tradable inputs and outputs; it provides a more accurate measure of the level of protection than the NCP. A EPC above 1

[2] The value added of a given commodity chains is its output value minus the value of tradable inputs used in the production process but that have been produced by others chains and should, therefore, not be counted in the additional value created by the commodity chain considered.

means that the selected systems is protected while an EPC below one means that the system generates less added value at market price than he would have at social prices or, in other words, that it is explicitly or implicitly taxed.

- The Equivalent Producer Subsidy (EPS) is a ratio of the total net transfer (L) above revenue at private price [EPS= L/A]. It indicates the share of income gained (or lost) for the system due to distortions induced by the current policy or market distortions. This ratio has been widely used as an instrument to measure and monitor the aggregated level of protection to a subsector during trade negotiations (W.A. Master 2003).

- The Subsidy Ratio to Producer (SRP) compares the net transfer to the revenue at social price (L/E) and provides another measure of the magnitude of the transfer induced between the selected systems and the rest of the economy. In case of positive aggregated transfer (L>0), it indicates the magnitude of the world price increase that would be required for the selected system to have a comparative advantages.

2.2. Characterization of representative systems

The development of a PAM begins with the characterization of representative systems for each subsector. The purpose of the desegregation of complex commodity systems into stylized commodity chains or representative systems is both methodological and analytical.

In term of methodology it is difficult to collect the data required by type of expenditure (tradable input, labor, capital) and revenue (output) under an aggregated format at the subsector of commodity system level and to carry out the analysis at this level. For assessing the comparative advantages of a whole subsector or commodity systems it is much more manageable to initially compute a PAM for each representative system identified and, then, to aggregate them into one PAM, using a scale parameter.

From an analytical point of view, agricultural commodities are being processed into different final outputs that don't have the same importance in the agro-food system (i.e. fresh tomato and tomato past) and/or agricultural trade (import substitution or exported) and, therefore, relate to different policy issues. For instance, wheat is at the same time the raw material for wheat flour production, the supply of which is at the foundation of the Syrian food security strategy, but it is also processed into pasta, which has not a strategic position and can be indifferently consumed locally or exported. Disaggregating a commodity system into representative systems also allows focusing on a specific policy issue without having to invest scarce resources in analyzing the whole system, including the components that do not present a particular stake for decision makers. For instance, the study did not consider the production of table olives because they represent only a minor outlet for olive producers. Along the same line, the study look at the comparative advantages of filtered olive oil targeting the European market as the non filtered olive oil would not match importers' requirements. Eventually, the characterization of representative system allows taking into consideration the effect of different technologies on the performance of the subsector.

Each commodity system has been broken down into representative systems on the basis of the following criteria.

Main outputs produced. This has been already mentioned in the introductory section of the report, the interest being focused on assessing to what extent the type of processing and the targeted market may have or not an impact on the comparative advantages of the agricultural commodity considered. Main type of outputs produced can be further discriminated on the basis of their quality. The study didn't emphasize this aspect because it would have required the mobilization of complementary technical expertise and data collection on the cost and revenue associated with different quality standard to address it properly. A distinction was made, however, between the flour produced by GECPT combining 75% of soft wheat and 25% of hard wheat and the flour produced by private mill with a higher content of soft wheat. For wheat pasta a distinction was made between low quality pasta and high quality pasta which corresponds to a different volume of wheat requirement per volume of output (1.4 kg of wheat per kg of low quality pasta against 2.5 kg of wheat in the case of high quality pasta). For the remaining main outputs selected, the analysis was made on the basis of a uniform quality derived from the average value of the different quality standards produced weighted by their share of the total volume of production.

Farm level technology. The same raw agricultural product can be produced through different techniques. While a wide set of parameters can be retained to characterize agricultural practices, this study focuses on water management technique, distinguishing between gravitational or network irrigation, well/pump based irrigation and rainfed cropping systems. The study was not in a position to assess the effect of drip irrigation for cotton production, while this improved water management technique was used to characterize a representative system for orange production. For wheat, a distinction was made between hard and soft wheat, while in the case of tomato, tomato produced in open field and greenhouses have been analyzed separately. For beef meat production, only specialized private cattle breeder (representing 40% of the total domestic supply) raising 15 to 60 animals per cycle of production were retained because this type of farm was easier to cover in term of primary data collection.

Processing technology. This criterion was particularly relevant for olive oil milling, where two processing technologies coexist to get a similar output, the old hydraulic press system and the centrifuge system that have been introduce more recently. For the other commodity systems a uniform processing technology was retained. For wheat flour a distinction was made between high and low capacity mills to take into account possible economies of scales. However, the total capacity of an entire mill can be increased by adding milling lines of similar capacity without shifting to a different technology, mitigating the expected correlation between processing capacity and productivity per unit of input.

Institutional setting. The nature and degree of public direct intervention and involvement in the management of the commodity chains varies across commodities and the different stage of the chain (i.e. farm production, marketing, processing). State managed farm were not included in the analysis as they remain, at most, marginal for the selected commodities. Public intervention at the down stream level of the selected subsectors is also very limited with the exception of cotton and wheat. For cotton this criteria is not relevant as marketing and processing is entirely managed by CMO. Wheat flour production is, therefore, the only commodity systems where public and private operators co-exist, even though the largest share of the wheat produced is milled through the public sector (80% in 2002).

Market of reference for final output parity price. The selection of the parity price that is used to determine the value of the revenue at social price refers by definition to a specific location. For main outputs targeting the domestic market the parity price is computed on the basis of the CIF price at border plus the transportation costs to reach the point where the final output is produced in the domestic market. In the case of main output targeting foreign market the parity price should incorporate the transport cost up to the foreign markets' borders where the Syrian product will actually compete with the output produced in the targeted market and with output coming from other exporting countries and targeting the same foreign market. Therefore in the case of exported outputs, the selection of the targeted foreign market and the related shipment cost will have an impact on the value of the parity price. The GAFTA region and the European Union are the two foreign markets that have been chosen in the CAS study to determine the parity price on the basis of the major patterns for Syrian agricultural trade and current Syrian participation in trade agreements.

For cotton and wheat based product (flour and pasta), as different farm level technologies co-exist it was decided to compute a specific PAM integrating the results obtained for each different water management techniques (public network irrigation, well irrigation and rainfed in the case of wheat). This consolidation has been done on the basis of the crop area planted under each technology. For cotton, data on the planted area under public networks irrigation (37%) and under private well irrigation (63%) was provided by CMO. For the consolidated PAM for standard flour produced by the GECPT (a combination of 75% of soft wheat flour and 25% of hard wheat) the share of network irrigation, well irrigation and rainfed production was estimated to be respectively 36%, 12% and 27% for soft wheat production, while the share for hard wheat production are 7%, 10% and 8%[3], respectively. Wheat pasta production uses exclusively hard wheat. The share used to develop the wheat pasta integrated PAM are 23% for hard wheat irrigated network, 27% for well irrigated production and 50% for rainfed.

Table 2: Weighting coefficients for Integrated Wheat Flour PAM

Type of wheat	Network irrigation	Well irrigation	Rainfed	Total
	Share of production per ecology			
Soft wheat	47%	17%	36%	100%
Of irrigated area	*74 %*	*26 %*		
Durum wheat	29%	39%	32%	100%
Of irrigated area	*42 %*	*58 %*		
	Share of production per ecology weighted per type of wheat mix			
Soft wheat	36%	12%	27%	75%
Durum wheat	7%	10%	8%	25%
Total	*43%*	*22%*	*35%*	*100%*

Table 3 presents the list of representative systems that have been identified and the different characteristics of each system. The last column indicates the policy issues that are relevant for each system.

[3] For details on the method applied to estimate cropping system area refers to Appendix A.

Table 3 : Combination of criteria for representative systems characterization.

N.	Systems name	Commodity	Main output	Farm level technology	Processing	Institutional	Targeted market	Main policy objective
1a	Int PAM lint cotton large ginery			all system				
1	PAM lint cotton netw irr large ginery.	Cotton	Lint cotton	network irrigation	large ginnery	public	export EU	currency earning downward linkage
2	PAM lint cotton well irr large ginery			well irrigation				
3a	Int PAM flour public large	Wheat		all system		public		food security
3	PAM flour soft wheat irrig net public			network irrigation				
4	PAM flour soft wheat well irr public	Wheat (soft)		well irrigation				
5	PAM flour soft wheat rainfed public		Standard Flour	Rainfed	large mill			
6	PAM flour hard wheat netw irr public			network irrigation		public	domestic market	downward linkage
7	PAM flour hard wheat well irr public	Wheat (hard)		well irrigation				
8	PAM flour hard wheat rainfed public			Rainfed				
9	PAM flour soft wheat netw irr public	Wheat (soft)		network irrigation	small mill	public		
10	PAM flour soft wheat netw irr private	Wheat (soft)	High Qual. Flour	network irrigation	small mill	private		
11a	Int PAM pasta hard wheat netw irr law quality			all system				
11	PAM pasta hard wheat netw irr law quality		Pasta (law quality)	network irrigation				
12	PAM pasta hard wheat well irr law quality	Wheat (hard)		well irrigation	pasta factory	private	export GAFTA	downward linkage and currency earning
13	PAM pasta hard wheat rainfed law quality			rainfed				
14	PAM pasta hard wheat rainfed high		Pasta (high quality)	rainfed				
15	PAM refined olive oil centrifuge	Olive	Filtered olive oil	rainfed	centrifuge	private	export EU	currency earning return to tree plantation
16	PAM refined olive oil hydraulic				hydraulic			
17	PAM tomato fresh open field reg			open field			export GAFTA market	
18	PAM tomato fresh green house reg market	Tomato	Fresh tomato	green house	sorting/packing	private		currency earning
19	PAM tomato fresh green house eu			green house			Export EU	
20	PAM tomato paste open field law		Tomato paste	open field	tomato paste factory	private	export GAFTA	currency earning
21	PAM orange fresh netw irr reg market			network irrigated			export GAFTA market	currency earning
22	PAM orange fresh well irr reg market	Orange	Fresh orange	well irrigation	sorting/packing	private		water saving
23	PAM orange fresh well drip			drip irrigation			Export EU	currency earning
24	PAM orange fresh netw irr europe			network irrigated				
25	PAM orange concentrate net Irr		Orange oncentrate	network irrigated	Evaporation unit	private	Domestic market	downward linkage
26	PAM of meat		Beef meat	specialized fattening farm	Butcher			
27	PAM of live animal	Livestock	Live Animal	specialized fattening farm	(no processing)	private	Domestic market	income opportunity and food security
28	PAM packed milk		Fresh packed milk	small private farmers	dairy factory			

2.3. Data sources and analysis for budget development.

The computation of PAMs' indicators for each representative system requires the elaboration of a budget for the whole system where costs are classified into tradable inputs and domestic factors. This budget at the system level is build trough the combination of individual budgets developed for each economic agent involved in the production of the main final output from the farm level up to the parity point, e.g., processing unit, exporter, etc.

Individual budgets have been developed on the basis of primary data collected within the framework of the CAS study for marketing and processing operations and within the framework of Farming System Study (FSS) concurrently carried out by NAPC for the elaboration of farm budget. In total 54 agents involved in processing and/or marketing have been interviewed while 187, plots including milk farm, have been covered by the FFS team (Table 4and Table 5).

The limited size of the sample for post-harvest activities does not hampered the representativeness of the developed budgets since there is less variability in the input-output coefficients for a given processing technology compared to agricultural practices. In order to improve the reliability of the data collected at farm level, this information has been cross-checked and validated with national statistics provided by the Ministry of Agriculture, in particular to adjust yield levels.

The organization of the farm data collection on a plot basis didn't allow capturing the share of fixed costs managed at the farm level (equipments, tools) that is allocated by the farmer to the cropping of the selected commodity. For infrastructure, such as well, greenhouse, pipes, the corresponding value were taken from previous survey done by NAPC, while the utilization of agricultural machinery was treated as a "pure" variable cost, as if the farmer was paying for a service provided by another agent. This adjustment has a limited effect in terms of PAM computation since each cost item (fixed and variable cost) has to be decomposed into tradable and domestic factor component[4].

[4] In the case of a tractor owned by a farmer, the depreciated value of the tractor would be inputted as a fixed cost and further decomposed into tradable input (the value of the tractor) and domestic factor (the capital cost corresponding to the opportunity cost of the capital invested in the tractor); fuel, spare parts, and driver salary if any would be reported as variable costs and further decomposed into tradable and domestic factor components. When the tractor is used on a service basis, the value of the fee paid by the farmer to the service provider is decomposed into tradable and domestic factor component including the value and opportunity cost of the investment done by the service provider for purchasing the tractor. This option is less accurate in term of farm management analysis as we assume that the equipment are optimally used (no excess capacity) but does not change the results the perspective of a subsector analysis.

Table 4: Sample of farm level budget per cropping system.

Water source	Commodities									
	Cotton	**Wheat**		**Olive**	**Orange**	**Tomato**		**Livestock**		**Total**
		Durum	Soft			Open field	Green house	Milk	Meat	
Network flood	33	9	6		11					59
Well flood	16	14	2		6	8	4			50
Well drip	2				4					6
Well sprinkler	1	3		1						5
Rainfed		22	6	19						47
Animal								10	10	20
Total	52	48	14	20	21	8	4	10	10	187

Table 5: Sample of agents interviewed for post harvest operations.

Final output	**Institutional status**	**Collector/trader**	**Processing**	**Output wholesaler**	**2nd processing**	**Total**
Lint cotton	Public	Integrated in Ginning costs	2 ginneries			2
Flour	Public	Integrated in miller costs	2 mills			2
	Private	3 traders	3 mills			6
Pasta	Private		1 mill		2 pasta factories	3
Olive oil	Private		2 hydraulic units 3 centrifuge units	1 big trader 2 small traders	2 filtering units	10
Fresh tomatoes	Private		3 sorting/ packaging units			3
Tomato concentrate	Private		3 factories			3
Fresh oranges	Private		4 sorting/ packaging units			4
Orange concentrate	Private		3 units of concentrate productions			3
Packed fresh milk	Private	3 collectors	2 private factory 1 public factory			6
Beef Meat	Private	6 traders	2 slaughter houses		4 Butchers/ meat retailers.	12
		12	31	3	8	54

Given the complexity and heterogeneity of the prevailing land tenure, the value of the usual share cropping contract was used as a proxy to input into the farm budget the opportunity cost of land utilization. The sharecropping system mentioned in the literature[5] varies according to the crop: 15% of the value of the production for cotton, and 20% for cereals. As, no value was available for tomatoes and oranges an arbitrary value of 30% has been applied, to take into account the rather more risky nature of these crops and the longer period of land immobilization that a sharecropping contract on a perennial crop supposed.

Another issue pertaining to the imputation of fixed cost is the percentage of utilization of processing capacity for agro-industries which determine the value of fixed cost per unit of output. While for most of the selected subsectors the capacity does match the current supply, the level of capacity utilization was an issue for the private wheat mill and FOJC unit. For wheat, private millers interviewed claimed that there were not able to run their processing line optimally with the share of the wheat that is sold out of the GECPT channel (share of GECPT around 70% and 30% marketed through the private channel). While some part of the wheat purchase by the GECPT is milled by private mill on a fee basis, private millers have to rely on potential wheat import to complete as far as possible their procurements. In the framework of the CAS study, we assumed that a private mill will use 50% of its capacity a rather optimistic scenario because, otherwise, the comparison between public and private operators' performances would be biased in favor of the public sector (operating at full capacity). It would, therefore, not be possible to compare the sole effect of the two types of mill ownership on the level of economic efficiency achieved. In the case of FOJC units, we retain the very low level of capacity utilization because it results from the "structural" lack of supply of fresh oranges for industrial processing (10% of the total supply). As a matter of fact, industrial processing is residual outlet for orange farmers and traders selling oranges to juice extracting companies only when they do not match the requirement of the fresh orange market.

2.4. Decomposition of cost items into tradable and domestic factor component

The distinction between tradable input/output and domestic factors is at the core of the PAM concept. Once the budget as been established each cost item is decomposed across these categories. Revenue earned from the output sale is straightforwardly classified into the tradable output category.

Labor directly provided or paid for by any agents involved in the subsector is considered as a domestic factor. Family labor at the farm level was inputted into the budget using the corresponding wage rate for each agricultural operation. In order to assess the potential of labor regulations on the performances of the systems analyzed, two categories of labor are distinguished.

- Qualified labor is subject to formal employment contract associated with employer's contribution to social insurance retirement schemes. Drivers, technician and engineers attending to processing equipments, clerks, manager were included into this category
- non-qualified labor, or so called casual labor such as farm workers, packer and so forth that are often paid on a daily or short term basis without any formal contract.

[5] N.FORNI, 2001, Land Tenure Systems Structural Features and Polices, Project GCP/SYR/006/ITA.

The decomposition becomes more complex for intermediaries inputs. For physical goods directly purchased by an agent, 5% of the purchase value was arbitrarily inputted as qualified labor, 5% as non-qualified labor and 10% as capital cost to account for the domestic resources spent to market the product up to the delivery point. The remaining 80% was considered as tradable input.

Complementary investigation and computations were made for complex intermediary input, such energy purchase, maintenance services, transport, that incorporate a more balanced share of labor, capital and tradable. Specific budgets were developed on the basis of data already collected by NAPC or additional data collected by the FFS to estimate more precisely the labor, capital and tradable content of one hour of tractor, or water pumping and so forth (c.f. Table 6 - for an illustration of the computation refers to Appendix B). This additional computations have been limited to major cost items such as mechanized farm operation, energy, while for other cost item the allocation was made on the basis of educated guess or coefficient applied in other study made in similar environment. When a selected sub-sector use as an input an output produced by another subsectors, and that this output is not international traded, the decomposition coefficient where taken from the corresponding PAM.

2.5. Budget development at social price

The determination of the value at social price for each cost and income items is done by correcting the prevailing market price on the basis of the price distortions that have been identified.

2.5.1. Adjustments for tradable output and input.

Exchange rate.

The PAMs are computed in Syrian Pound, therefore the exchange rate is an important determinant of the value of tradable output and input usually quoted in US Dollar on the world market that need to be converted in SP. For instance an exchange rate that is arbitrarily fixed by the government at a higher than the one that would prevail without public intervention (overvaluation) decrease the price of tradable input and output in their local currency equivalent. Given the rapid integration of the various currency exchange mechanisms that were still enforced in the recent years, the small gap between Syrian inflation rate and the one observed in its main trading partners countries, and the depreciation of the US Dollar against the Euro, the currency of the major Syrian trading partners outside the GAFTA region, no significan distortion was accounted for between the current exchange rate and the social exchange rate. Therefore, we applied the so called "Beirut exchange rate" (for an average rate of 51 SP to USD 1 for year 2003) to compute the parity price for the main output in Syrian Pound equivalent and no correction was made to adjust input value at social cost beyond the sole adjustment for duties and subsidy (see hereafter).

Table 6: Coefficients applied to decompose intermediate inputs into tradable and non tradable components.

Section/ Item	Coefficients for decomposition				
	Labor	Qual. Labor	Capital	Tradable	Source or rationale
Fixed cost					
Building	0,30	0,10	0,30	0,30	Educated guess
Generator	0,05	0,05	0,10	0,80	Physical good
Vehicle for handling	0,05	0,05	0,10	0,80	Physical good
Truck 5-20t	0,05	0,05	0,10	0,80	Physical good
Van	0,05	0,05	0,10	0,80	Physical good
Machine/equipment (law 10)	0,05	0,05	0,10	0,80	Physical good
Tube pipe	0,05	0,05	0,10	0,80	Physical good
Plastic sheet	0,05	0,05	0,10	0,80	Physical good
Refrigerator	0,05	0,05	0,10	0,80	Physical good
Agricultural machinery	0,05	0,05	0,10	0,80	Physical good
Well	0,12	0,00	0,48	0,40	Budget from NAPC water study
Variable cost					
Agricultural input					
Manure	0,07	0,05	0,17	0,72	Beef production PAM budget
Seeds	0,05	0,05	0,10	0,80	Opportunity cost is imported the imported input
Fertilizer and chemical input	0,05	0,05	0,10	0,80	
Mechanized labor	0,33	0,05	0,17	0,45	Budget from FSS data
Animal draft	0,40	0,00	0,30	0,30	Educated guess
Wheat	0,05	0,05	0,10	0,80	Physical good
Barley	0,05	0,05	0,10	0,80	Physical good
Cake	0,46	0,03	0,14	0,37	Cotton subsector PAM
Maize	0,05	0,05	0,10	0,80	Physical good
Bran	0,26	0,06	0,15	0,54	Wheat PAM
Straw	0,27	0,05	0,14	0,55	Wheat PAM farm budget
Vitamin	0,05	0,05	0,10	0,80	Physical good
Mineral	0,05	0,05	0,10	0,80	Physical good
Soybean	0,05	0,05	0,10	0,80	Physical good
Lentils	0,05	0,05	0,10	0,80	Physical good
Rambling	0,40	0,07	0,13	0,40	Wheat budget by less TI
Veterinary services	0,00	0,40	0,10	0,50	Educated guess
Milk replacer	0,05	0,05	0,10	0,80	Physical good
Starter (calf)	0,05	0,05	0,10	0,80	Physical good
Purchased conc. Mix.	0,05	0,05	0,10	0,80	Physical good
Other feedstuff	0,05	0,05	0,10	0,80	Physical good
Other costs					
Maintenance (with spare parts)	0,10	0,10	0,20	0,60	educated guess
Spare parts alone	0,05	0,05	0,10	0,80	educated guess
Transport	0,33	0,05	0,17	0,45	Mechanized labor use as a proxy
Electricity	0,01	0,03	0,04	0,92	Data collected from electricity company
Fuel	0,05	0,10	0,10	0,75	educated guess
Water	0,10	0,10	0,40	0,40	educated guess
Telecommunication	0,05	0,10	0,40	0,45	educated guess
Other	0,30	0,20	0,20	0,30	educated guess
Packing	0,05	0,05	0,10	0,80	educated guess
Milling fee	0,19	0,31	0,24	0,26	Computed from Wheat Pam
Network Irrigation cost	0,22	0,05	0,09	0,64	NAPC water study
Pump Irrigation cost	0,10	0,00	0,05	0,85	NAPC water study
Maintenance of the drip	0,10	0,10	0,20	0,60	Educated guess

Output parity price.

The estimation of the representative system's revenue at social prices use the price paid for importing the main output produced by the system without duties when the domestic market is the target, or the price received for exporting the main output to the targeted foreign market. While for cotton the world prices quoted in various markets places (Liverpool, New-York...) can be easily used as a reference or parity price, the determination of the appropriate parity price for other main output, such as flour or fresh product, is more difficult because transaction are settled on a bi-lateral basis where prices are largely determined by the quality of the product and the specific situation of the supplier and the buyer. For these cases, the determination of the parity price relies on FAOSTAT database, using average import value per ton as a reference price for the targeted area for product that are exported and the CIF unit value of import in Syria's neighboring countries for main output targeting the domestic market. After selecting the reference price an addition shipment cost is added (for main output substituting to import) or deducted (for main output targeting export market) to compute the parity price that would received the last agent of the selected system. Various sources have been used to assess these shipment costs. In some case these references have been adjusted to take into account the probable higher cost for shipping product in or out Syrian harbors that are not on the major shipping route. Additional adjustments were also made to take into account possible differences in quality standard. The reference used to compute the parity prices are listed in Table 7.

Subsidy and tax on output.

Cotton and wheat are the only raw material of the selected subsectors for which there is a direct government intervention. In 2003 each cotton farmer received a subsidy equal to 53% of the total value of the revenue get from his cotton sale. This subsidy allows CMO's ginneries to purchase their raw material at a price close to the one that would prevail on the world market[6]. This subsidy is directly paid to the farmer by the Agricultural Bank. For wheat, there is fixed price determined by the government that should be applied by GECPT to purchase wheat. On the downstream part of the systems, GECPT is also requested to sell flour at fixed price of 7200 SP per ton, well below the 14 500 SP per ton charged by the private millers. This corresponds to a subsidy to consumers. In order to account for this flour price distortion we assumed that GECPT received a transfer from the government covering the losses induced by imposed low price on its output. By convention all budget at social prices were computed without taking into account these transfers.

[6] It is important to note that there is no international trade for raw cotton.

Table 7: References for the computation of main final output parity prices.

Main output	Output price			Shipment cost		
	Reference	adjustment	Source	Reference	adjustment	Source
Cotton lint	Cotton (COTLOOK, index 'A' 1-3 / 32, Friday		FAO (http://www.fao.org/es/esc/prices)	Transport cost to Europe		*CMO*
Flour from soft wheat	Wheat (US No.2, Soft Red Winter Wheat , Delivered US Gulf ports (Tuesday)	– Increase by 1.12 to take in account average gross margin from US milling industry – Decrease by 0.9 as Syrian wheat flour would not be of the same quality standard	FAO (http://www.fao.org/es/esc/prices) USDA Wheat Situation And Outlook Yearbook, 2004 (http://usda.mannlib.cornell.edu/reports/erssor/field/whs-bby/whs2004.pdf)	**Transport cost US Gulf to Egypt**	Increase by 50% to take into consideration packing cost as wheat may be shipped in bags and not in bulk	*FAO food outlook(various issues) (http://www.fao.org/giews/english/fo/index.htm)*
Wheat hard	Wheat (US No 2, Hard Red Winter , Delivered US Gulf ports ord. Prot.(Tuesday)		*Adjustment and source Idem with soft wheat*	**Transport cost US Gulf to Egypt**		
Pasta	Import unit value in targeted countries		*http://apps.fao.org/*			*interview*
Olive oil	Olive oil, Physicals, naked EU origin in bulk ex tank UK virgin less than 1% of free fatty acid)		*http://r0.unctad.org/infocomm/anglais/olive/prices.htm* *http://www.public-ledger.com/*			*interview*
Fresh Tomato	Import unit value in targeted countries		*http://apps.fao.org*			*interview*
Tomato paste	Idem					
Fresh orange	Idem					
FOJC	Import unit value in neighboring countries		*http://apps.fao.org*			
Beef meat	Import unit value in neighboring countries		*http://apps.fao.org*			*interview*
Fresh milk	Import unit value in neighboring countries for powder milk to which packing cost computed from primary data collected are added.		*http://apps.fao.org*			

Tradable input social price.

Tradable input values at social prices are determined by deducting from the corresponding value at private price the value of the custom duties, and conversely by adding the value of any subsidies (Table 8). For physical goods directly purchased by selected subsectors' agents, the duty enforced since the last revision of the tariff was directly applied. For complex intermediate inputs, combining a more balanced share of tradable and non tradable factors, a level of duty was adjusted according to the share of each tradable used in the services provided. A specific attention was given to the adjustment of the cost of energy, a major input for the agricultural subsectors. Since the current market price in Syria (7 SP/liter) is lower than the prevailing world fuel price (estimated at 12.22 SP per liter for 2003), fuels users benefit from an implicit subsidy that amount to 43% (for additional detail on computation see Appendix C).

Correction for subsidy on input.

The reduced value of the fee paid by farmers benefiting from gravitational network irrigation is the only significant public subsidy noted on the input side. Based on data collected by NAPC earlier, the total cost for gravitational cost has been estimated at 8700 SP per hectare and per year while farmers pay only 3500 SP (Appendix D).

Table 8: List of the coefficients applied for deriving tradable input social price from observed prices.

Section/ Item	Duty/implicit subsidy			Section/ Item	Duty/implicit subsidy	
	Value	Reference (HS code)			Value	Reference (HS code)
Fixed cost				***Agricultural input (continued)***		
Building	30,0%	edu guess		Soybean	1,7%	
Generator	1,7%			Lentils	1,7%	
Vehicle for handling	10,0%	8427		Veterinary	1,7%	
Truck 5-20t	14,5%	8704		Milk replace	7,0%	2309
Van	50,5%	8704		Starter (calf)	1,7%	2309
Machine/equipment (law 10)	1,7%	8704		Purchased conc.mix	1,7%	
Tube pipe	47,0%	3917		Other feedstuff	1,7%	
Plastic sheet	47,0%	3921		Vet, drugs, feet trimming	1,7%	
Refrigerator	7,0%	8418		***Other costs***		
Agricultural machinery	1,7%	8433		Maintenance (with spare parts)	20,0%	8708
Well Irrigation cost	30,0%	computed		Spare parts alone	20,0%	8708
Agricultural input				Transport	-18,0%	computed
Seeds	1,7%			Electricity	-13,0%	computed
Fertilizer and chemical input	1,7%	3102		Fuel	-40,0%	computed
Mechanized labor	-18,0%			telecommunication	10,0%	educated guess
Wheat	1,7%	2304		Other	10,0%	educated guess
Barley	1,7%	2305		Packing	23,5%	3923
Cake	1,7%	2306		Milling fee	22,0%	computed from Wheat Pam
Maize	1,7%	2307		Network Irrigation cost	-6,0%	computed
Bran	7,0%	2302		Pump Irrigation cost	-35,0%	computed
Vitamin	1,7%			Maintenance of the drip	-35,0%	computed
Mineral	5,0%	2512				

2.5.2. *Adjustment for domestic factors.*

Labor and capital market

The estimation of the social value of the domestic factors is less straightforward as it cannot be backstopped by the value of similar input on the world market. A first adjustment is made to take into account the impact of particular official regulation on factors costs. For labor, the value of skilled labor or permanent laborer, who required the payment of various social contributions (such as pension contributions), was adjusted accordingly. As the tax on capital invested was minimal, we didn't account for any tax on capital invested. However, for domestic factors, a large share of the divergence between private and social price values might be caused by factors markets inefficiency. The assessment of these inefficiencies is a challenging task that requires specific studies. Based on expert judgment, it was assumed that there is no particular distortion on the labor market and that the current wages reported for various tasks reflect the true opportunity cost of labor.

For the capital market, the current saving rates offered by the Commercial Bank of Syria, 5.5% per year, was used to compute the opportunity cost of the capital immobilized in the process of production at private price, while a rate of 3% equivalent to the weighted rate computed by the FMI for the newly industrialized Asian economies was applied at social prices. Given the high level of public intervention on the financial market and the tighten credit policy for private agents it is likely that the opportunity cost of capital could be higher at private price. However, it is important to note that the value of the private interest rate does not enter in the computation of the DRC to assess the comparative advantages of a representative system. Therefore, it was decided to keep the observed value in the current situation and to assess through sensitivity analysis the impact of higher interest rate on the private profitability of the system.

Social price of water.

Putting a value on the water used is even a more challenging task than valuing other natural resources like land. There are almost no references available, as actual transaction occurring on water only concern limited quantities used during the establishment of perennial crops to take care of the seedlings; these quantities are not comparable with the volume of water required for irrigated field crops.

The method applied to find a proxy for the value of the water was to compute the residual value of the water once all the cost (including land cost) have been deducted from the revenues of each system (Table 9). Then the ratio of these residual profits divided by the volume of water required by each system provide the maximum cost that can be supported by each system, otherwise the profit will be negative. This first analysis clearly show the very low efficiency of irrigated cotton and wheat systems, all of them loosing money with or without inputting the land price, therefore we obtained a negative value of the water use indicating that the utilization of water turn actually into a negative value added. The other water-based systems (irrigated oranges and tomatoes) obtained a positive value, meaning that the major issue in terms of water used efficiency concerned wheat and cotton irrigated systems. The opportunity cost for water for these two systems correspond to the value of water forgone in the most profitable alternative crops that can be produced under equivalent conditions. Tomato being the only alternative for which we have data available, although using other major field crops (maize, barley, tobacco…) would be a better alternative, we assumed that a less intensive tomato cropping systems than the one surveyed in the south of Syria would be more likely in the major wheat and cropping area of the north. The water value computed for these low intensive systems is 6 SP/m^3; taking into account the higher agro-climatic and market risk attached to tomato cropping that is a perishable crop and the fact that yield is lower for tomato grown in wheat and cotton producing area than in the tomato specialized areas,, we assumed that the actual value of water foregone by a farmer who decides to crop wheat or cotton rather than tomato would be of 3 Sp/ m^3.

Table 9: Computation of the value of water

Systems	Revenue	Tradable input	Domestic factor	Land rent	Profit	Water use	Profit per cubic meter
	SP/ha	SP/ha	SP/ha	SP/ha	SP/ha	m^3/ha	SP/ m^3
Lint cotton network	76 466	34 040	48 297	10 936	-16 808	11 500	-1.46
Lint cotton well	80 474	38 958	64 068	11 517	-34 069	13 800	-2.47
Flour soft network	29 704	13 837	10 127	5 696	44	3 000	0.01
Flour soft well	36 221	22 128	19 931	6 944	-12 782	3 780	-3.38
Tomato open field	639 231	242 635	202 816	103 342	90 439	10 000	9.04
Tomato green house	1 352 745	402 840	320 784	326 875	302 246	14 000	21.59
Orange network	386 671	77 524	122 953	106 577	79 616	9 000	8.85
Orange well	386 671	117 393	120 711	106 577	41 990	9 000	4.67

3. Results

3.1. Performance the representative systems

The budget for each system and the PAMs derived from these data has been computed on an Excel spreadsheet (example in Appendix E). Selected PAMs' values and indicators are presented in Table 12. The three left hand columns provide the value of profit at private and social prices and the value of transfers for one ton of main output. The next three columns provide the same indicators but with reference to one hectare of cropped area (or head of animal), which might be a better reference for agricultural policy formulation, in a context where land become a scarce resources with an increasing rural population.

3.1.1. Profitability

The financial cost-benefit ratios computed for each system are below 1, indicating that for 2003, taken as a reference year by the study, **all the system were profitable with the exception of three sub-systems** which are wheat flour produced from soft wheat cropped under well irrigation systems (BC=1.11), and flour made from hard wheat cropped under network (BC=1.11) and well irrigation systems (BC=1.11). However, wheat flour production remains profitable under the current policy environment at the aggregated level when all the different cropping techniques are considered together (BC= 0.78).

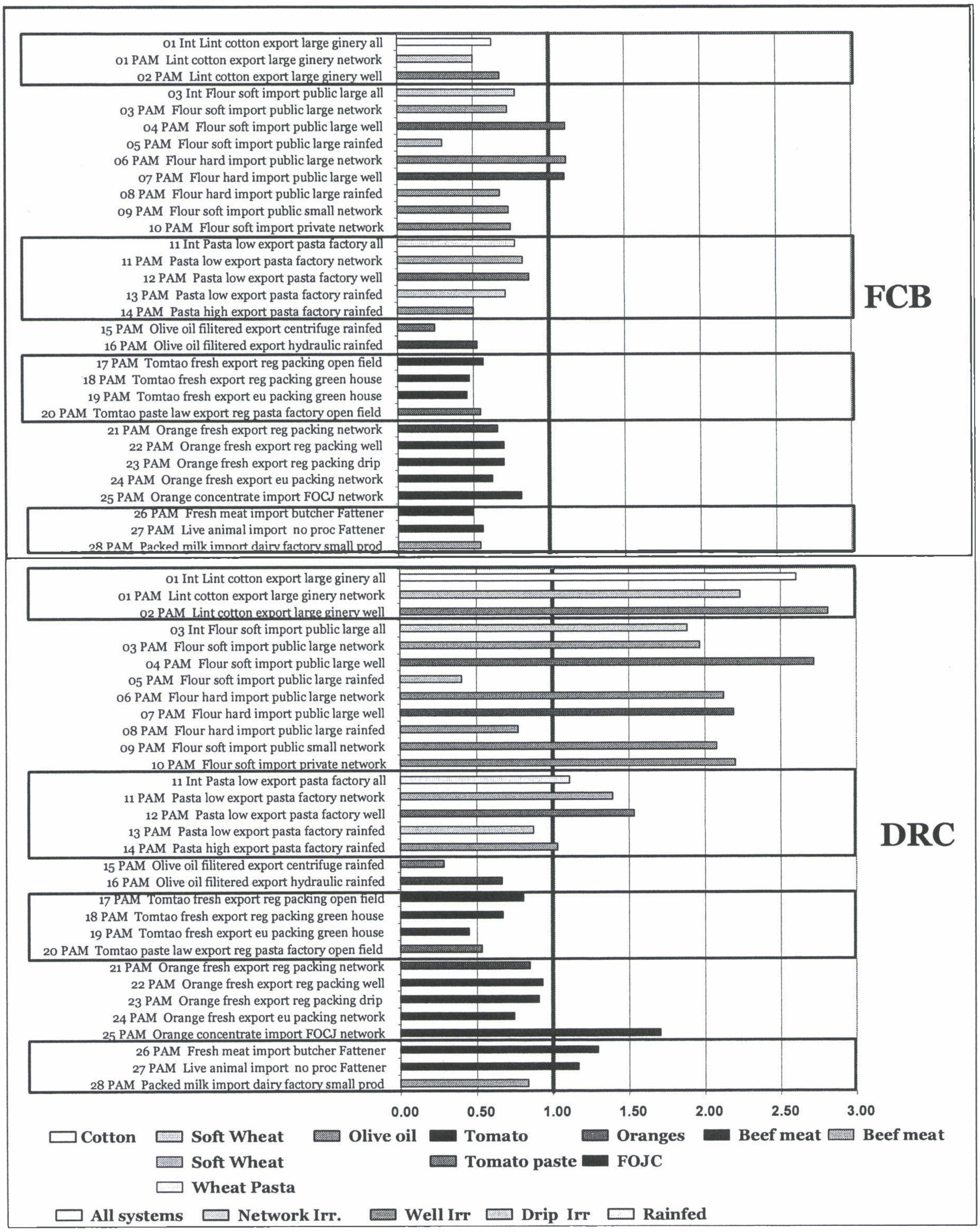
The most profitable systems are in decreasing order, filtered olive oil produced by centrifuge processing techniques (BC=0.25), fresh packed tomatoes, tomato paste and livestock products (BC around 0.50), lint cotton (0.62), fresh packed oranges (around 0.70) followed by wheat based products, wheat pasta (0.78) and wheat flour (0.78).

In absolute terms, the highest profit (profit or return?) per hectare is achieved by fresh tomato (≈ 555000 SP/ha), followed by olive oil production (≈ 120 000 SP/Ha) and fresh orange (≈ 110 000 SP/HA). Field crops, cotton and wheat achieved a much lower return per hectare compared to the tomato and perennial production systems. However, cotton still generates a profit (≈ 40000 SP/ha) that is around four times the profit per hectare obtained by wheat based systems (≈ 5000 SP/ha for wheat flour and ≈ 6500 SP/ha for wheat pasta system).

3.1.2. Economic efficiency

Looking at the profit obtained at social price, the group achieving the highest profit at private price, i.e. tomato, fresh oranges and olive oil, maintains its profitability under the new policy and market environment, while, for the field crops' group, only systems producing pasta, hard wheat flour and some of the systems producing soft wheat maintain their profitability. In the livestock

Figure 5: Financial Cost Benefit and Domestic Resource Cost ratios.



group, only the production of packed milk is economically efficient, while meat production becomes unprofitable in both live animal and fresh meat form. Cotton production also is not profitable at social price while, the same apply to the production of FOJC.

It is worth noting that **with the exception of cotton, systems targeting foreign markets have comparative advantages, while systems targeting the domestic market do not have comparative advantages, with the exception of the milk system**. With the important exception of cotton, these results indicate that the current structure of the Syrian export flows is not significantly affected by the current Syrian agricultural policy; in other words that systems such as oranges, tomato or pasta systems which are already exporting a share of their output will do so even without any policy or market induced distortion.

In terms of return to Domestic Factors invested at social price, with a DRC ratio far above the unit, lint cotton (DRC=2.5), wheat flour (DRC=2) and FOJC (DRC= 1.7) clearly do not have a comparative advantages, while on the contrary filtered olive oil (DRC = 0.5), fresh packed tomato (DRC=0.5), tomato paste (DRC=0.5) have a strong comparative advantages. With a DRC ratio close to unit, fresh packed oranges (DRC= 0.8), packed fresh milk (DRC= 0.8), wheat pasta (DRC= 1.1) and beef meat (1.3), are in an intermediate position.

3.1.3. Transfer of resources

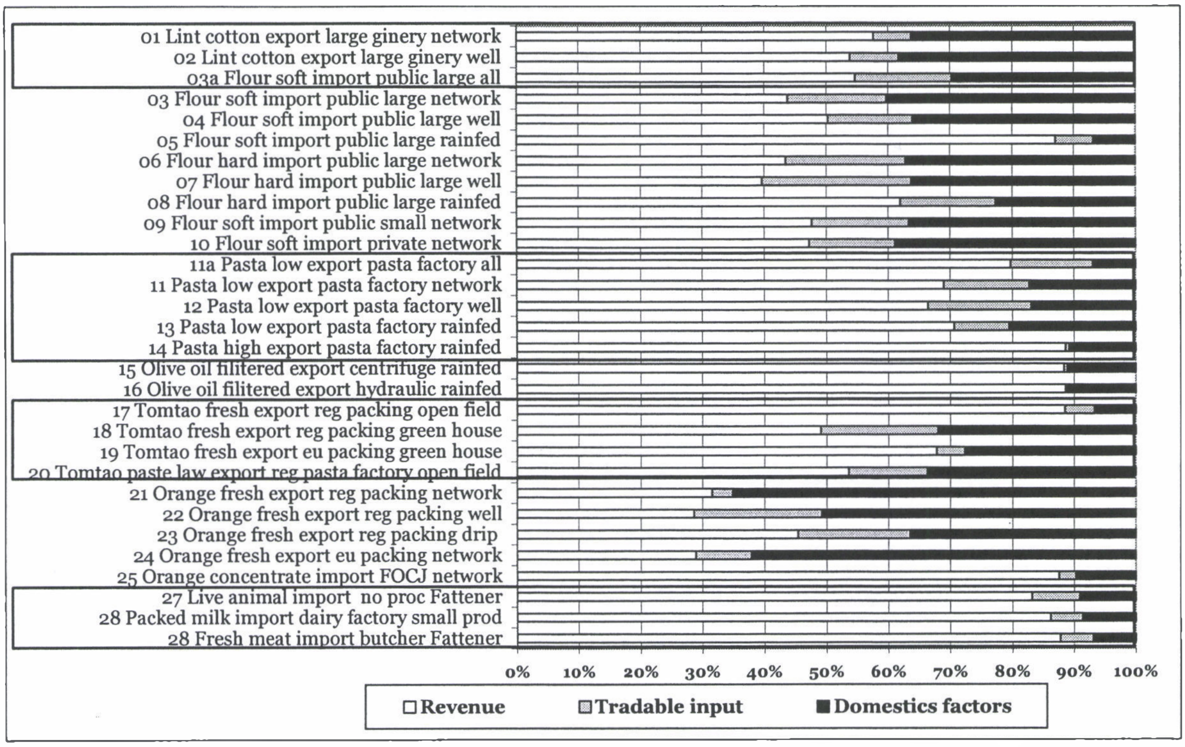
The lower FCB ratios obtained compared to the DRC indicate that all systems are more profitable at private price than efficient at social price. **All the systems** have an Effective Protection Coefficient above the unit, and accordingly, **benefit on aggregate from a positive transfer of resources from the rest of the economy** with the exception of fresh tomato exported to Europe and tomato paste systems (Figure 5). The EPS, comparing the share of the revenue earned by each system as result of transfers from the rest of the economy, is highest for the cotton systems (≈ 80%) while it represent around 40% for the wheat based systems having the lowest comparative advantages and for the FOJC system. For the remaining systems, the share of revenue derived from transfers from the rest of the economy ranges from 15% to 20% of the revenues at market prices.

Looking now, at the respective share of the divergences on tradable output, input and domestic factors in the transfers of resources reported by the 3rd row of the PAM (Figure 6), **on average, the largest share of the transfer are due to price distortions on tradable output, affecting the revenue of the systems** (62% on average for all the selected systems), while distortions induced by the current policy environment and market imperfection have a more limited impact on the value of tradable input (17% on average for all the systems).

The ratio of the EPC to the NPC can be used as an indication of the respective impact of the current policy on tradable outputs and tradable inputs prices distortions. When the value of the EPC is close to the value of the NPC, most of the protection is due to the output trade policy, and the ratio is close to 1, while a value of the EPC/NPC far above one indicates that prices distortions are also due to the policy interventions on tradable inputs (subsidies). For most of the systems, the ratios of NPC to EPC are rather small, meaning that most of the distortion between the private price and the social price situation is due to divergence on tradable outputs. In other words the current policy, inputs and factors markets' configuration has a limited influence on the production costs. As expected, the gap between the EPC and NPC is higher for lint cotton and flour systems, which are the only selected systems with a public intervention on the output side in the form of price control and subsidy.

The relative importance of distortions due to domestic factors prices on the total value of transfers varies across the systems. It is largely higher for systems that are water intensive indicating the importance of the transfers observed when the social value of water is taken into consideration.

Figure 6: Respective share of the divergence on revenue, Tradable input and Domestic factors in Total divergence.



Given the importance of the cotton and wheat in the Syrian Agricultural policy and the high level of distortion characterizing these two subsectors, an attempt was made to estimate the absolute value of the transfers related to these two subsectors. The estimation used the average area planted between 1999 and 2001 for each crop, our estimation of cropped area across the different ecologies (Table 2), data provided by the GECPT on the allocation of the wheat across the different wheat based systems and the value of the nets transfers computed from the respective PAMs. The results (Table 10) confirm the strong bias of the current policy and market environment in favor of the cotton subsector. **While cotton represents only 14% of the total area of both crops, it benefit from 60% of the value of resources transferred from the rest of the economy to these two subsectors. In terms of ecologies, the estimations presented in Table 10 also indicate that half of the resources transferred are in favor of irrigated well based systems while these ecologies represent only 26% of the whole cropped area**.

Table 10: Estimation of total transfers value for cotton and wheat subsectors

Systems	Ecologies			Total	
	Network	Well	Rainfed	Value	Share
Area in hectare					
Wheat Durum pasta	47 209	80 383	166 400	293 992	15%
Wheat Durum flour public	105 078	178 917	370 374	654 369	34%
Wheat Soft public	169 497	59 553	378 600	607 650	31%
Wheat soft private	32 285	11 343	72 114	115 743	6%
Cotton	96 734	164 709	0	261 444	14%
Total	450803	494 905	987 488	1 933 197	100%
Share	23%	26%	51%		
Value of the transfer SP per hectare					
Wheat Durum pasta	21 467	21 277	7 655		
Wheat Durum flour public	14 077	15 174	3 457		
Wheat Soft public	19 750	21 133	5 076		
Wheat soft private	22 877	24 479	5 880		
Cotton	107 288	110 978			
Total transfer (million of SP)					
Wheat Durum pasta (private)	1 013	1 710	1 274	3 998	9%
Wheat Durum flour public	1 479	2 715	1 280	5 474	12%
Wheat Soft public	3 348	1 259	1 922	6 528	14%
Wheat soft private	739	278	424	1 440	3%
Cotton	10 378	18 279		28 658	62%
Total	16 957	24 241	4 900	46 098	100%
Share	37%	53%	11%	100%	

3.2. Determinant of comparative advantages

The impact on economic efficiency of alternative technology, targeted market or other characteristics is assessed by comparing the result of representative systems producing the same main output, with the same characteristics, but the one under consideration.

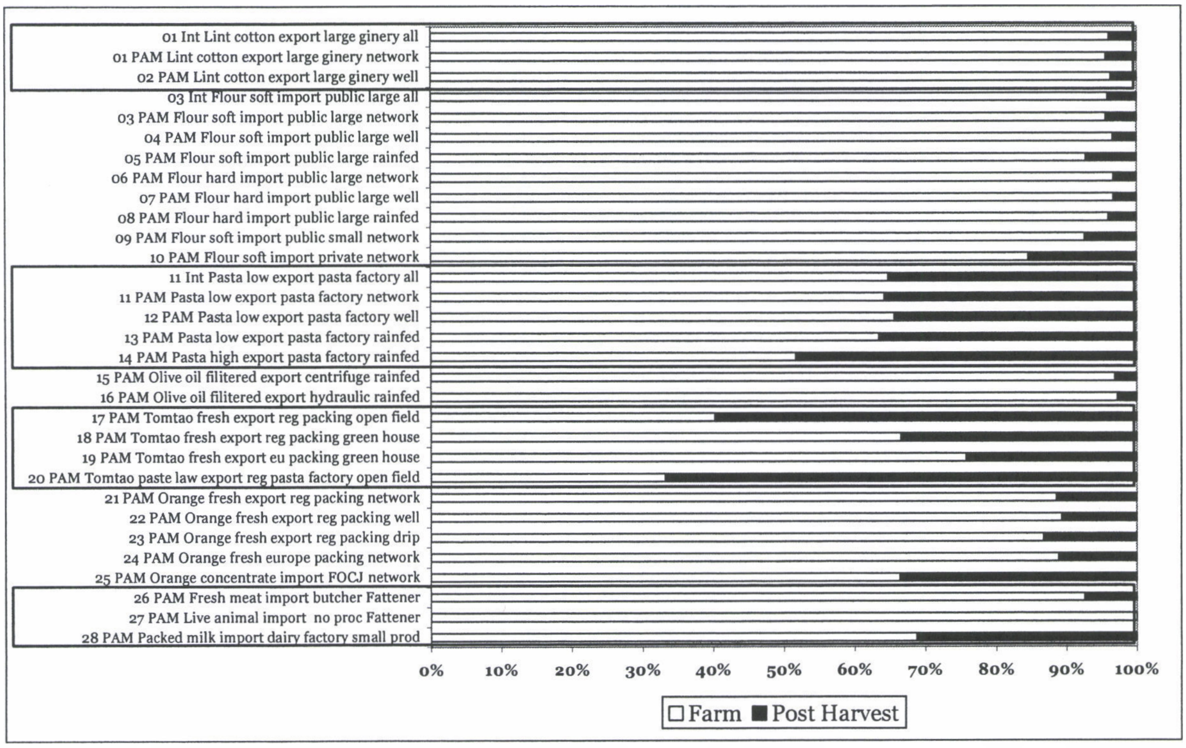
3.2.1. Processing technology

Processing technology are less variables than farming level technology, only a few of them were retained at the system selection stage to deserve special attention. For soft flour there is almost no differences in profit level between the large capacity public mill (400 t of flour/day – system 4) and the small capacity public mill (100 t of flour per day- system 6) although the profit level is slightly higher for the larger mill at social price. This small difference can be explained by the similarity of the milling technology used in both cases, the capacity of the larger mill being actually increased by multiplying the processing lines rather than through a shift in the technology used. For the olive oil production centrifuge technology has a positive impact on both the profitability and the efficiency of the systems, but it should be noted that the old hydraulic press technique is also, both, profitable and efficient.

Thus in the case of wheat and olive, neither the scale of operation nor the type of technology used at the processing stage is a major determinant of the economic efficiency of the systems. In other word, a system cannot get a comparative advantage by modifying the sole technology applied at the processing level.

The limited impact of processing technology on the efficiency of the selected systems is also due to the limited share of the processing operations in the total cost of these systems as they represent on average less than 18% of the total systems' costs at private prices. Processing costs represent even less than 10% of the whole system's cost for lint cotton, wheat flour and refined olive oli production, while logically the share of processing costs in total cost is higher (from 30% to 60%) for the production of more elaborated agro-food products such wheat pasta, FOJC or tomato paste (Figure 7).

Figure 7: Respective share of Farm level and post-harvest operations in total cost.



Along the same line, the level of capacity utilization was one the issue raised during the interview of wheat mills' mangers. A simple simulation made on the basis of the private wheat flour systems' PAM shows that the DRC is highly sensitive to the level of capacity utilization only for the lowest value of the level of capacity utilization of milling capacity (Figure 8). From a system perspective, increasing the utilization of processing capacity at the milling level does not significantly reduce the value of the DRC when the quantity processed exceeds 10000 tons (around 15% of its total capacity).

The same issue was raised for the production of FOJC, characterized by the difficulties encountered by this industry to procure the required volume of oranges. A similar simulation was done using the FOJC PAM, but looking also at the effect of changes in the recovery rate, the quantity of concentrate that can be produced from one ton of fresh oranges (the current ratio mentioned was 60 kg of FOJC from 1 ton of fresh oranges). **The results of the simulation indicate that the improvement of the system efficiency can be substantially improved by the use of oranges with high juice content, compared to the much more limited improvements that can be realized only by the increased utilization of the existing processing capacity** (Figure 9).

Figure 8: Utilization of milling capacity and DRC value

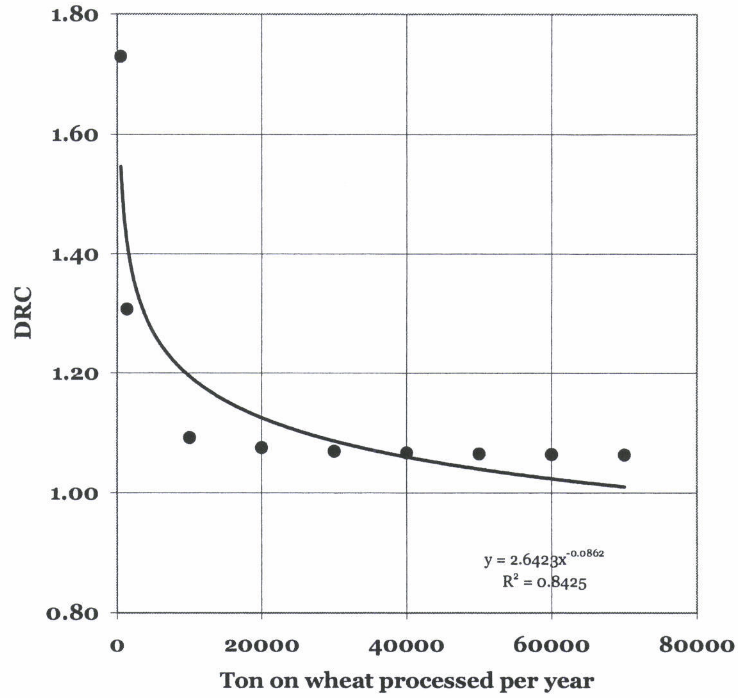
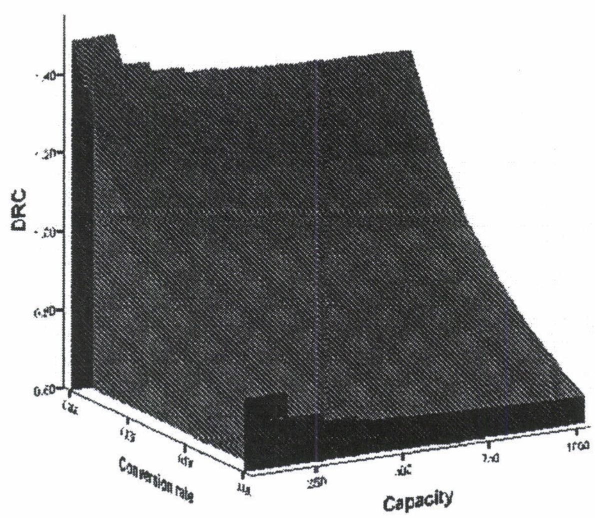


Figure 9: Effect of capacity utilization and recovery ratio on FOJC DRC value.



From an institutional perspective, the comparison between performances of the flour produced by the GECPT' mills and the one produced by private millers does not reveal any significant differences, as both systems achieved a comparable positive profit per ton of output at private and social price.

3.2.2. Farm level technology.

The impact of farm level technology on the systems' performance is far more important. Water procurement technique was the factor used to differentiate systems at the farm level. **For field crops, in all cases systems relying on wells irrigation generate the lowest profit**. System based on network irrigation yield the highest profits for cotton and soft wheat, while rainfed systems achieved the highest profit for hard wheat at private price. **At social prices, for field crops only rainfed based systems enjoy comparative advantages, while cotton and wheat based irrigated systems have a very high DRC for both network and well based system**. The imputation of water value at social price increases the cost of irrigated systems and thus magnifies their lower efficiency compared to rainfed system.

It should be noted however, than even without inputting a value for water, cotton and wheat based systems would not have comparative advantages (Table 11). This is particularly the case for cotton systems for which the valuation of water represents only around one third of the total transfer of resources to this subsector. The subsidy given to raw cotton price at farm level also represents 50% of transfers received from the rest of the economy for the cotton lint produced from irrigated network system.

Table 11: Effect of water valuation on field crops systems' efficiency.

Systems	With water valued at social price		Without water valued at social price		% change	
	DRC	Transfer	DRC	Transfer	DRC	Transfer
01 PAM Lint cotton export large ginnery network	2.24	88 058	1.41	59 499	37%	32%
02 PAM Lint cotton export large ginnery well	2.81	86 701	1.81	54 160	36%	38%
03 PAM Flour soft import public large network	1.97	7 054	1.29	3 818	35%	46%
04 PAM Flour soft import public large well	2.72	6 143	1.91	2 825	30%	54%

Well based irrigated systems' profitability is also highly constrained by the cost of pumping for irrigation, which represents 39% of the total cost in the case of cotton and 25% for soft wheat production. The implicit subsidy on fuel also contributes to the transfer of resources to these two systems and further hampers their economic efficiency. Orange is the only other selected commodity where different irrigation techniques are concurrently applied. Also in this case, irrigation network is more efficient than well based systems with a DRC of 0.80, while well based systems have a DRC of 0.93. The introduction of drip irrigation systems slightly improved the efficiency of well based system by decreasing its DRC to 0.91, but further field investigations combining multi-disciplinary expertise are needed to thoroughly assess the likely positive impact of improved water management technology of system efficiency.

Table 12: PAMs' selected values and indicators.

Systems	PAM selected value						Selected ratios					
	Per ton of main final output			Per hectare (or animal head)								
	FINANCIAL PROFIT	SOCIAL PROFIT	TRANSFERS	FINANCIAL PROFIT	SOCIAL PROFIT	TRANSFERS	FCB	DRC	NPC	EPC	PSR	ESP
01 Int Lint cotton export large ginery all	32 369	-53 207	85 577	40 371	-66 917	107 288	0.62	2.60	1.96	2.59	1.36	0.78
01 PAM Lint cotton export large ginery network	45 310	-42 748	88 058	55 097	-51 982	107 079	0.50	2.24	2.04	2.62	1.40	0.78
02 PAM Lint cotton export large ginery well	27 719	-58 982	86 701	35 480	-75 497	110 978	0.68	2.81	1.96	2.64	1.38	0.79
03 Int Flour soft import public large all	1 950	-3 725	5 675	5 488	-8 293	13 781	0.78	1.89	1.45	2.09	0.57	0.41
03 PAM Flour soft import public large network	2 446	-4 607	7 054	6 850	-12 900	19 750	0.73	1.97	1.33	1.89	0.66	0.51
04 PAM Flour soft import public large well	-904	-7 047	6 143	-3 110	-24 243	21 133	1.11	2.72	1.33	1.96	0.58	0.45
05 PAM Flour soft import public large rainfed	6 430	3 671	2 759	11 831	6 755	5 076	0.30	0.40	1.30	1.48	0.26	0.21
06 PAM Flour hard import public large network	-873	-5 385	4 512	-2 723	-16 800	14 077	1.11	2.13	1.18	1.59	0.37	0.32
07 PAM Flour hard import public large well	-800	-5 426	4 626	-2 624	-17 798	15 174	1.11	2.19	1.17	1.65	0.38	0.33
08 PAM Flour hard import public large rainfed	3 446	1 946	1 500	7 940	4 484	3 457	0.68	0.77	1.16	1.25	0.11	0.10
09 PAM Flour soft import public small network	2 446	-4 921	7 368	6 850	-13 780	20 629	0.73	2.08	1.38	2.03	0.70	0.52
10 PAM Flour soft import private network	2 795	-6 542	9 337	6 848	-16 028	22 877	0.75	2.20	1.44	2.05	0.74	0.55
11 Int Pasta low export pasta factory all	3 228	-1 093	4 321	6 568	-3 338	9 906	0.78	1.11	1.26	1.48	0.23	0.19
11 PAM Pasta low export pasta factory network	3 020	-4 481	7 501	8 644	-12 823	21 467	0.83	1.40	1.26	1.55	0.33	0.27
12 PAM Pasta low export pasta factory well	2 185	-5 605	7 790	5 968	-15 309	21 277	0.87	1.54	1.26	1.62	0.34	0.28
13 PAM Pasta low export pasta factory rainfed	5 717	1 832	3 885	11 266	3 610	7 655	0.71	0.88	1.23	1.36	0.15	0.13
14 PAM Pasta high export pasta factory rainfed	26 358	-758	27 117	28 861	-830	29 691	0.50	1.03	2.03	2.39	0.55	0.34
15 PAM Olive oil filtered export centrifuge rainfed	97 268	77 290	19 978	127 456	72 594	54 862	0.25	0.28	1.19	1.20	0.17	0.14
16 PAM Olive oil filtered export hydraulic rainfed	67 664	34 900	32 764	90 514	46 686	43 829	0.53	0.67	1.33	1.35	0.28	0.21
17 PAM Tomato fresh export reg packing open field	4 476	1 453	3 024	235 011	76 269	158 742	0.57	0.81	1.29	1.37	0.25	0.20
18 PAM Tomato fresh export reg packing green house	10 123	5 211	4 912	601 333	309 537	291 796	0.48	0.67	1.17	1.21	0.22	0.20
19 PAM Tomato fresh export eu packing green house	14 779	26 285	-11 505	558 658	993 556	-434 898	0.46	0.45	0.44	0.57	-0.20	-0.32
20 PAM Tomato paste law export reg pasta factory	11 344	16 764	-5 420	177 092	261 705	-84 612	0.55	0.54	0.82	0.69	-0.11	-0.14
21 PAM Orange fresh export reg packing network	11 341	4 600	6 741	111 593	45 259	66 334	0.66	0.85	1.13	1.08	0.17	0.16
22 PAM Orange fresh export reg packing well	9 225	1 807	7 418	90 773	17 783	72 991	0.70	0.93	1.13	1.13	0.19	0.18
23 PAM Orange fresh export reg packing drip	6 753	1 739	5 014	66 448	17 113	49 336	0.70	0.91	1.14	1.16	0.16	0.15
24 PAM Orange fresh export eu packing network	13 516	9 366	4 150	133 000	92 166	40 834	0.63	0.75	0.97	0.98	0.09	0.09
25 PAM Orange concentrate import FOCJ network	15 985	-31 331	47 315	4 797	-9 403	14 200	0.82	1.71	1.60	1.96	0.68	0.43
26 PAM Fresh meat import butcher Fattener	68 337	-13 800	82 137	13 667	-2 760	16 427	0.50	1.30	1.77	2.93	0.55	0.34
27 PAM Live animal import no proc Fattener	17 541	-2 832	20 372	8 770	-1 416	10 186	0.56	1.17	1.44	2.38	0.35	0.25
28 PAM Packed milk import dairy factory small prod	8 343	1 805	6 538	31 705	6 860	24 845	0.55	0.84	1.48	1.66	0.25	0.19

3.3. Sensitivity of systems' efficiency to changes in tradable and factor prices.

3.3.1. Sensitivity analysis

As mentioned in section 2.2, the construction of the PAMs relies on the collection of primary and secondary data including a number of hypotheses made with regards to the value of parity prices for tradable outputs, macro-economic aggregates such as exchange rate, interest rate and prevailing distortions on domestic factors markets. It is therefore necessary to asses to what extent the PAMs' indicators are sensitive to any changes in the value of the various components of the budgets at private and social price. The level of sensitivity is determined by computing the value of the selected indicators for different values of the selected PAM budgets component (quantity, price, etc.). The simulated values of the selected budget components are randomly generated within an interval centered on the initial value inputted in the system's budget. For the CAS, an interval of -/+ 20% of the initial value have been used, with triangular shape distribution[7]. The series of value obtained for the PAM indicator is then regressed to the different corresponding values of the selected set of variables, the β coefficients of the multiple regression being the indicators of sensitivity. Figure 10 present the outcome of the sensitivity analysis of the DRC for the network cotton system. It shows that the DRC is highly sensitive to yield achieved in farmers field, the parity price for the lint cotton, and the ginning throughput. The DRC is much less sensitive to other variables selected in the budget of the cotton system.

Figure 10 : Sensitivity of the DRC to selected variable for Irrigated network cotton system.

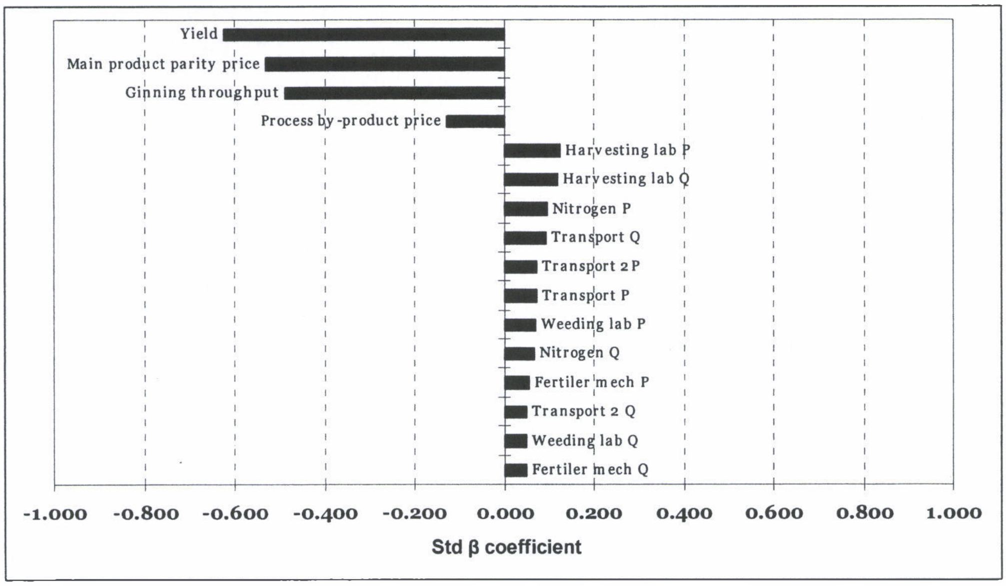


Table 13 presents the β value obtained for the DRC, aggregated by major selected outputs. While a certain number of core variables – output parity price, yield at plot level, exchange rate, interest

[7] For instance for a yield of 1 ton the values randomly generated will be contained between 0.8 ton and 1.2 ton with 50% of the values below 1 ton and 50% of the values above 1 ton, the mean of the values generated being 1 ton.

rate, level of distortion on the labor and capital market – have been systematically included in the analysis, the value, the quantity or the level of protection of inputs items have been included when they represent an important share of the total cost. For instance packaging has been included in the case of Tomato and Oranges systems because it represents a significant share of the costs. As a matter of fact, the impact of value changes of any cost items is mechanically determined by its share in the total cost. However, the fact that one cost item is included in the analysis does not necessarily mean that its variation will have significant impact on the PAM indicator.

The DRC is on average highly sensitive to the value of the main final output parity price (average $\beta = 0.5$) and to the yield achieved at the farm level (β=0.42). The inclusion of the recovery rate[8] in the case of cotton and FOJC systems show that **the technical performance at processing level can have an effect on the DRC value comparable to the effect of the yield at farm level**. In term of macro-economic environment, the DRC is highly sensitive to the exchange rate level ($\beta = 0.3$) and to the level of distortions on the labor market (β =0.3) while the interest rate has much lower impact on the value of the DRC (β=0.06)[9].

The impact of the other cost items is more system specific, as shown by the high sensitivity of wheat pasta, tomato and orange systems to the cost of packaging.

3.3.2. Probability of having comparative advantages.

The **sensitivity analysis confirmed the main output parity price and farm level yield values are the major determinant of the comparative advantages**. Several variables of the PAM varies across the years; this is particularly the case for yields that are affected by climatic conditions and for the world market prices of agricultural commodity and derived processed products which varies according to changes in demand and supply across the world. Thus, beyond the uncertainty of the estimation of several costs and prices inputted in the PAM, it is also necessary to look at the effect of the instability of these important parameters such as yields and parity prices, the variations of which can be traced back with available statistics.

The parity price of the main output and the yield achieved at farm level being the most unstable parameters among the ones that influence significantly the value of the DRC, a simulation was carried out for several systems to evaluate the probability to have a DRC below one. The variations of the parity price and yield inputted in the simulation follow the pattern of variations observed during the last decade. The data were collected from NAPC database and selected sources of information for international price (see Figure 11 and Figure 12 for the case of wheat).

[8] The quantity of output (lint cotton, flour) obtained from the quantity of raw agricultural material (i.e. raw cotton, wheat) processed

[9] The adoption of higher value of interest rate (20% instead of 3%) was tested on the case of the cotton irrigated network systems show that an increase by a factor of 6 of the level of the social interest rate does only increase the DRC by a factor 0f 1.09 every other factors being constant.

Table 13 : β coefficients of the regressions of the sensitivity analysis.

Category	Variable	Commodity												
		Cotton	Wheat Flour	Wheat Pasta	Olive oil	Tomato open	Tomato green	Tomato pasta	Orange fresh	FOJC	Meat	Cattle	Milk	Average
Tradable output	3.Out Main product parity price	0.512	0.393	0.695			0.664	0.766	0.537	0.662	0.280	0.000	0.573	0.508
Technology	1.Tec Yield	0.575	0.512	0.615	0.330	0.299	0.509	0.170	0.594	0.482	0.271	0.169	0.516	0.420
Technology	1.Tec Conversion rate	0.463									0.339			0.401
Macro-eco policy	2.MA Exchange rate	0.136	0.363	0.317	0.625	0.664	0.196	0.470	0.256	0.391	0.000	0.220	0.072	0.309
Market distortion	2.MA NQL labor distortion	0.190	0.162	0.236	0.561	0.543	0.339	0.273	0.503	0.370	0.123	0.000	0.382	0.307
Tradable input	4.TT Packaging			0.051		0.290		0.282	0.051					0.169
Tradable input	4.TT Agricultural input p		0.110	0.091							0.212	0.175	0.207	0.159
Tradable input	5.TNT Irrigation q	0.276	0.209	0.126		0.118	0.045							0.155
Domestic factor	6.DF Labor q	0.082			0.213									0.147
Tradable input	5.TNT Irrigation cost	0.262	0.060	0.130		0.117			0.130					0.140
Domestic factor	6.DF Labor p	0.086			0.216	0.100			0.095	0.070			0.268	0.139
Tradable input	5.TNT Machinery p	0.054	0.079	0.067		0.200		0.144						0.109
Tradable input	4.TT Agricultural input q		0.121	0.082										0.101
Macro-eco policy	2.Ma Energy implicit subsidy	0.091	0.166	0.047	0.022				0.021		0.116	0.176		0.091
Tradable input	4.TT Energy p					0.079								0.079
Tradable input	5.TNT Transport p	0.073		0.098	0.026	0.091		0.084	0.065					0.073
Tradable input	5.TNT Transport q	0.073		0.116	0.026									0.071
Tradable output	3.Out Process by-product price	0.131	0.073	0.108	0.000	0.000	0.347	0.000	0.080	0.000	0.109	0.000	0.000	0.071
Tradable input	4.TT Chemical input p	0.095	0.079	0.089	0.020									0.071
Tradable input	5.TNT Machinery q		0.059	0.082										0.070
Tradable input	5.TNT Agricultural input p								0.065					0.065
Macro-eco policy	2.MA Interest rate social				0.021	0.092	0.043	0.026	0.061	0.066		0.143	0.037	0.061
Tradable input	4.TT Chemical input q	0.068	0.070	0.073	0.028									0.060
Tradable input	4.TT Investment									0.054				0.054
Tradable input	5.TNT Processing cost			0.081	0.027									0.054
Tradable input	5.TNT Establishment cost perennial				0.029				0.078					0.053
Macro-eco policy	2.MA Subsidy on pumping					0.044	0.042		0.051					0.046
Technology	1.Tec Capacity									0.035				0.035
Tradable input	4.TT Agricultural equipment					0.018			0.040					0.029
Macro-eco policy	2.MA Labor tax					0.028			0.026	0.016				0.023
Macro-eco policy	2.MA Subsidy on irrigation								0.021					0.021
Macro-eco policy	2.MA Interest rate private				0.018								0.023	0.020

Figure 11: Observed pattern of yield variations for Wheat (source: NAPC database)

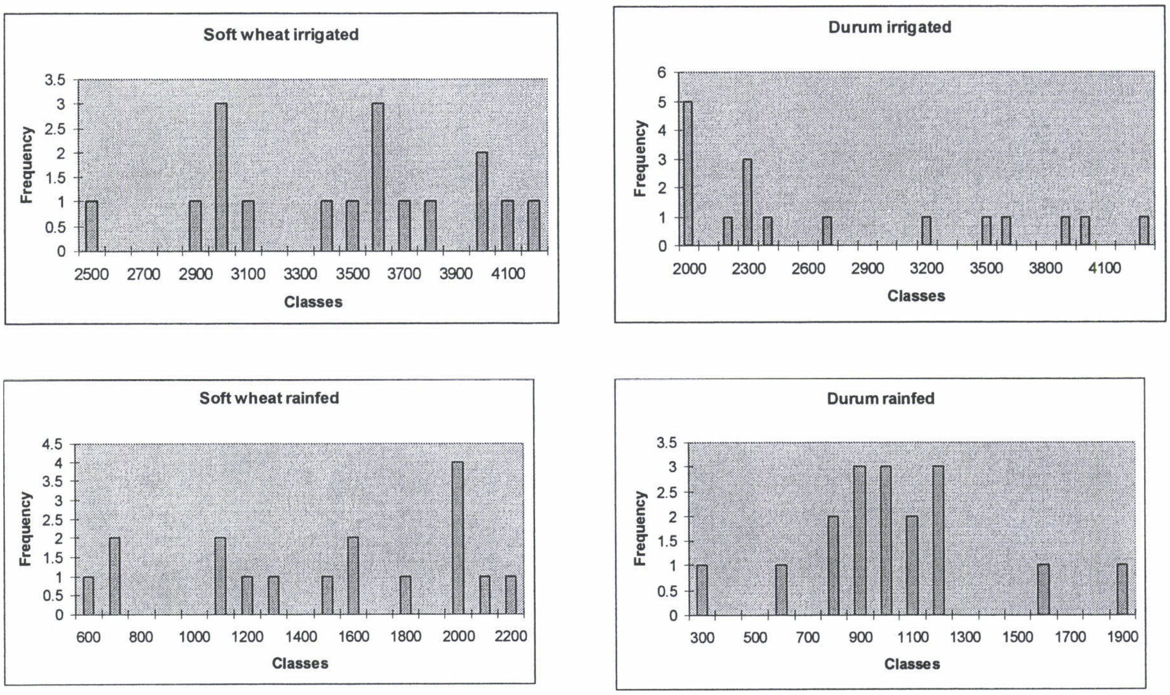
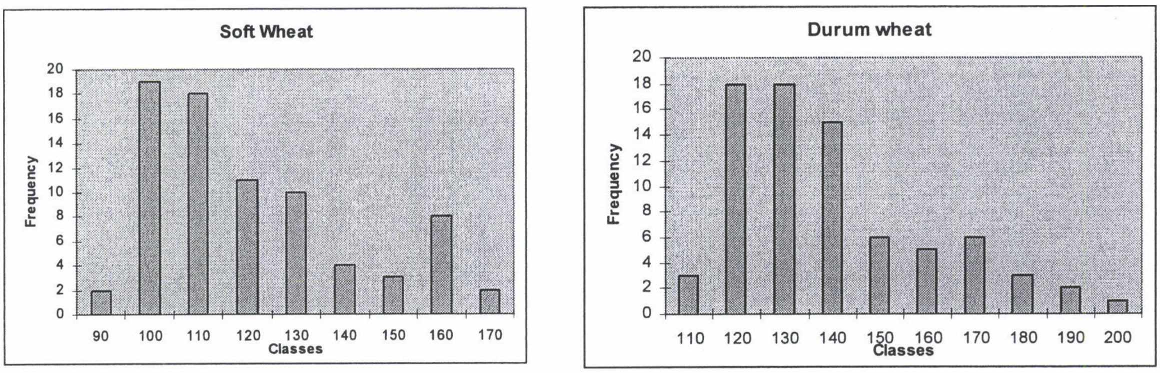


Figure 12 Observed patterns of price variations for wheat (Source FAO database)



These patterns of variation were used to randomly generate 100 sets of values for the parity price and the yield fitted to the observed distribution, and the corresponding DRC values. When the observed distributions do not correspond to any obvious law of probability, hypothesis are made on the probable distribution of the value of the input variable. For instance in the case of wheat the assumption was that the there is a higher probability to have yield above the average than under the average for irrigated based systems, while the yield would be equally distributed around the average for rainfed system (Figure 13)

Figure 14 presents the cumulative distribution of the DRCs values obtained for the Cotton and Wheat flour subsectors by computing the respective PAMs with the selected distribution for yield and output parity price values. The figure shows that for cotton there is a probability of 10% to get a DRC below 1 while for wheat the lowest DRC computed is 1.4, meaning that the **wheat subsectors would have no chance to have a comparative advantages under the yield and price levels observed during the last decade**.

The same method was applied to assess the probability for other selected systems to have a comparative advantages on the bases of the past yield and output parity price values. Table 14 presents the results obtained, indicating the probability to obtain a DRC below 1, the minimum DRC and the maximum DRC that was obtained during the simulation.

Olive oil, fresh tomatoes and oranges based systems have a probability of 100% to enjoy comparative advantages, under the same price and yield condition as the one recorded in the past ten years. This indicates the strong comparative advantages enjoyed by these systems. For FOJC, the CIF value per ton of concentrate imports in Syria's neighboring countries display large variations during the last decade (from 800 USD t up to 1770 USD per ton) giving evidence of the high instability that prevail on this market. Under these world market conditions the FOJC commodity chains has a probability of 30% to have a comparative advantages, which corresponds to the probability to have a parity price above 1700 USD per ton.

Table 14 : DRC sensitivity to parity price and yield instability for selected systems.

Systems		Lowest DRC	Highest DRC	Probability for a DRC<1
1	Lint cotton produced from network irrigated system exported to Europe	0.5	4.5	10%
3	Wheat flour public domesctic market	1.4	2.6	0%
15	Filtered olive oil centrifuge exported to Europe	0.25	0.7	100%
17	Fresh tomato from open field exported to GAFTA countries	0.51	0.6	100%
20	Tomato paste export to GAFTA countries	0.13	2.1	98%
21	Fresh orange from network irrigation exported to GAFTA countries	0.3	0.7	100%
25	Fresh Orange Concentrated Juice from network irrigation	0.85	4	30%

Figure 13: Distribution of yield value for wheat subsector's efficiency simulation.

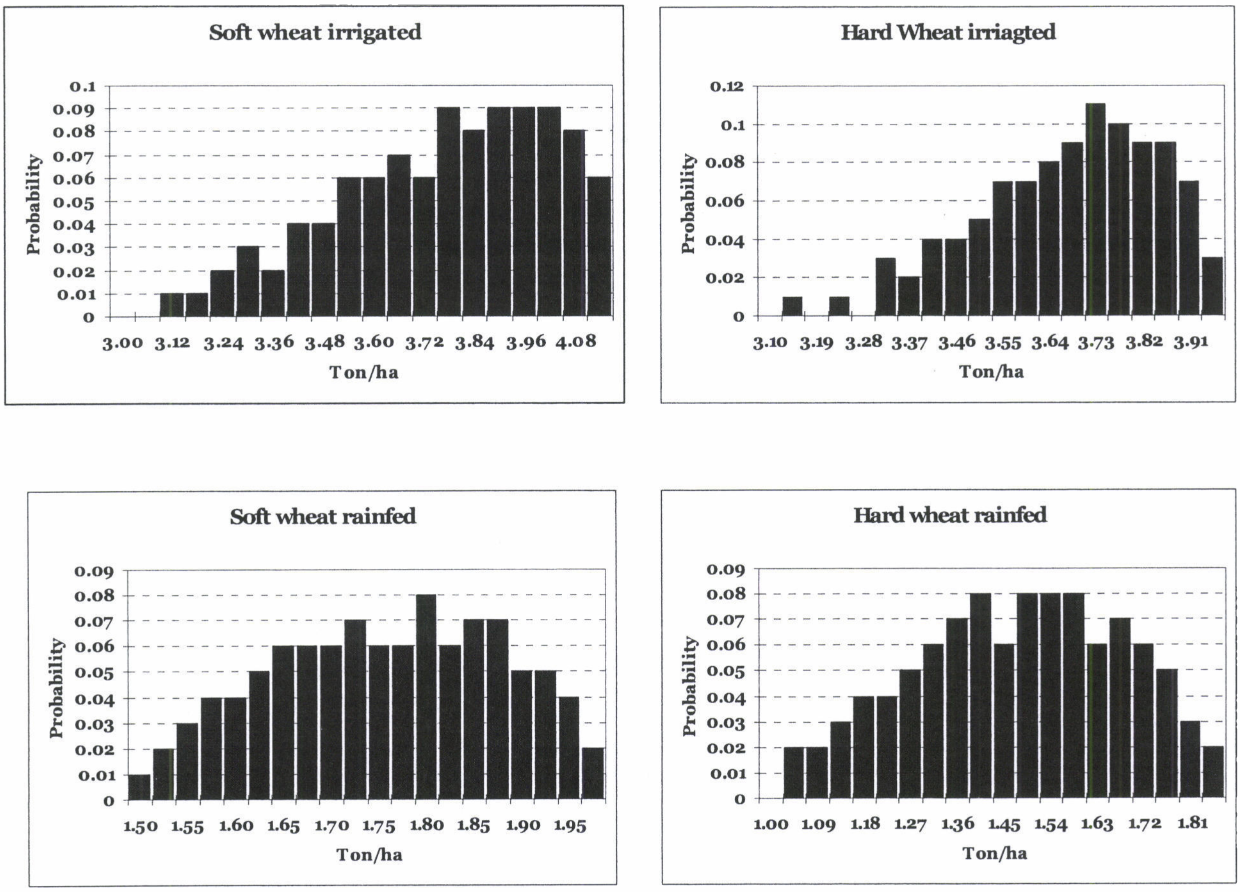
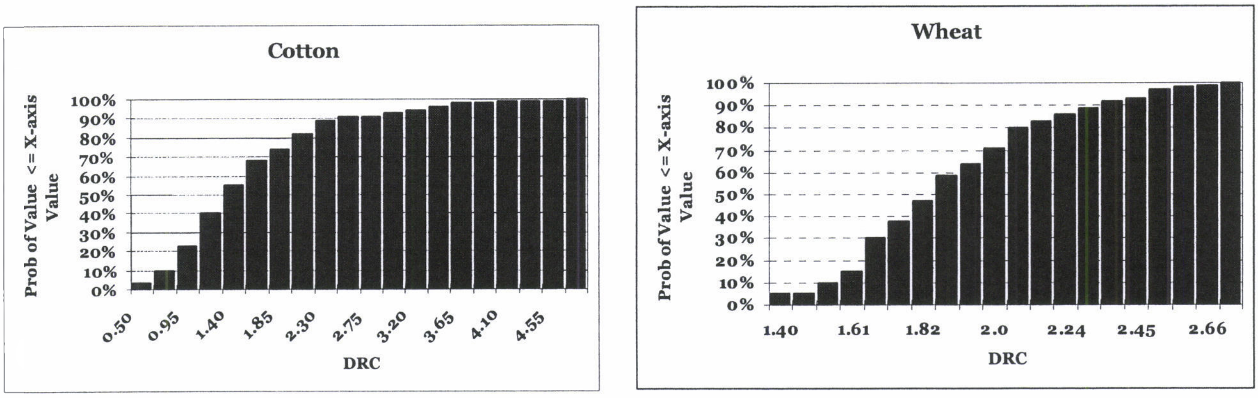


Figure 14: Cumulative distribution of the DRCs for Cotton and Wheat simulation



4. Policy implications.

4.1. Macro-level issues

All the selected representative systems benefit from a net transfer of resources from the whole economy. The **major shares of the transfers of resources to the systems are caused** by:
- **Trade protection** (tariff and non-tariff barriers) that increases the price of the systems' main outputs on the domestic market compared to the price prevailing on the world market.
- **Subsidy and fixed price** for cotton and wheat.
- **Non-accountability of the opportunity cost for natural resources** (water).

On the input side the current policy generates limited distortions as the average level of custom duty applied on agricultural input importations is quite low. However it should be noted that **important tradable inputs acknowledge a significant level of distortion**:
- The fee paid for network irrigation utilization at private price represents only 1/3 of the total irrigation cost that would prevail at social cost.
- The **low price of energy** compared to the prevailing parity price for diesel on the world market price is an implicit subsidy to systems that are energy intensive.
- For agro-food industries, a **high tariff on the importation of packaging device** (can, bottle…) has an impact on the profitability of agro-food industries

For domestic factors, the established labor regulation does not have a significant impact on the systems' efficiency because limited share of labor is employed on a permanent basis, and therefore subject to these regulations. Under the current level of knowledge the study assumed that there is no imperfection on the labor market, but the evolution of the wage level for casual labor should be carefully monitored if new job opportunities arise on the domestic or regional labor market. The profitability at private prices and the efficiency at social price of commodity chains that are labor intensive relatively to the others, such as cotton and olive, could be significantly affected by such increase in casual labor costs. The lack of any mechanisms to incorporate water value at private price is another sources of transfers in favor of the water intensive systems such as cotton and wheat, that are not able to covers these costs with the value added generated.

On the overall, the results indicate that the current macro-economic policy framework is supporting the development of the selected systems.

4.2. Cotton and wheat.

Under the current level of technology and within the current trends of world markets' prices, irrigated wheat and cotton systems have a low probability to have a comparative advantages. The simulation done with the highest level of prices recorded in the past decades indicate that the probability would be still very low for the wheat systems to have comparative advantages. The least efficient systems are the wells irrigated systems for both commodities which combine most of the distortions: subsidy, high cost in energy due to the pumping and higher volume of water used because of the lack of any restriction. Rainfed systems have a comparative advantages, but there is no rainfed cotton and they roughly represent less than 40% of the total wheat supply, and therefore have a relatively low weight for the overall efficiency of the wheat commodity chains.

The first option to enhance the comparative advantages of the **wheat and cotton** is to explore ways to improve the productivity through yield increase or costs reduction. Due to the rather high level of yield already achieved, one the **most promising ways would be to improve the water use efficiency** of the irrigated based cotton and wheat systems. Water use efficiency can be improved at short term by the dissemination of new irrigation technologies (drip irrigation) although the current study was not in a position to thoroughly assess the relative gain in economic efficiency that can be obtained by alternative irrigation technology. NAPC is finalizing a preliminary study on this subject, and this field should be further investigated. Another way that can be explored at mid, long term is the dissemination of new varieties that are less demanding in water for an equivalent yield level. The technical efficiency of the system can be also improved by looking at improvement at the post-harvest level. **For instance the ginning throughput recorded for the ginneries (32 kg of lint cotton for 100 kg of raw cotton) is rather law compared to the ginning throughput achieved in other major exporting areas (38 kg of lint cotton for 100 kg of raw cotton)**. Therefore there is an urgent need to identify and exploit source of productivity increase at the post-harvest level.

Another option to respond to the low economic efficiency of the cotton and wheat commodity chains is to **promote the utilization of the less costly systems in social terms: rainfed and network irrigation**. But as already noted, the area available for rainfed and network systems is limited which imply a net reduction in the cotton and wheat output as the national level. Furthermore, irrigated and rainfed systems do also have peculiar environmental costs that would have to be accounted for. While the wheat level of output should be in line with the food security objectives, it would be rationale at short term to limit as much as possible the allocation of the wells irrigated land to cotton which is the least efficient.

The last option to reduce the social cost induced by wheat and cotton production is to **promote crop substitution from cotton and wheat to promising crops**, at least for the systems that are the least economically efficient. However, this crops substitution strategy would be constrained by the absorption capacity of the domestic and world market for the crops that are promoted, a factor that would be crucial given the large areas involved.

In any case, **the mitigation of the high social cost induced by cotton and wheat production would likely rely on a combination of these options and would require the establishment of appropriate institutional mechanism to internalize the cost of water** in the business plan elaborated at private prices by cotton and wheat farmers, so as to incite them to shift as much as possible to less water intensive crops.

4.3. Promising crops

Syria has certainly comparative advantages for the production of olive oil, fresh tomato and oranges but having comparative advantages does not mean being able to export. Attention should be given to:

- **Reinforcing the current policy for trade agreements to reduce barriers to entry**.
- **Quality issue**: quality and sanitary issues are becoming more and more determining, even for standard quality product to access markets.
- **Appropriate marketing strategy**. Syria traditional markets are highly competitive and might become saturated. It is important to explore new market opportunities where habits are changing with income increase

The promising crops targeting the local market to respond to changes in food habit, such as beef meat, milk or Fresh Orange Concentrated Juice (FOJC), does not show any comparative advantages except for fresh packed milk. Although, the selected representative systems do not cover the entire diversity of technology encountered at farm level (cattle breed) or the existing institutional set ups (cooperative sector was not taken into account for beef production), it is likely that the current level of technology does not allow reaching a level of productivity required to have a comparative advantages. The promotion of new systems should carefully assess the viability of technical options within the Syrian economic environment. The low efficiency of the FOJC system is mainly due to the low conversion ratio at the processing level due to the unavailability of appropriate oranges varieties. The efficiency of the system depends also on the capacity of the Syrian agriculture to supply a volume of juicy oranges adequate to allow using the processing capacity at their optimal level.

5. Conclusion.

The PAM provides a consistent framework to assess the impact of policy options on the **comparative advantagess of commodity chains;** it should, however, be seen as **only one element in the formulation of agricultural policy** that cannot be limited to the quest for economic efficiency and to the exclusive promotion of commodity chains that have a comparative advantages and to neglect the other ones. This is not acceptable because comparative advantages can change according to the evolution of the world market for tradable outputs as well as inputs, or through technical changes or following an increase in the price of domestic factors. It is important to keep in mind that this is a static method and that the application of sensitivity analysis does not thoroughly overcome this limit. Furthermore **the method does not take into account non-efficiency policy objectives, such as income distribution along the commodity chains and/or among different socio-economic groups involved in the production process**. However, it **provides a mean** to estimate the social cost associated with policy options pursuing non-efficiency objectives (such as ensuring a minimum level of income to certain categories of population) and therefore **to better assess the trade-off between different policy options**.

In order to improve its relevance the method should be combined with other approaches to complement the results obtained with complementary set of knowledge. For instance, the outcome of the Farming System Study concomitantly carried out by the NAPC with FAO support will allows to better grasp the function of a given commodity in the whole farm and might lead to mitigate conclusions derived from a high DRC. While the present study already provides a fairly large and in-depth coverage of commodity systems that are representative of the diversity of the Syrian agriculture, the development of additional PAMs for other commodity, planned by the NAPC, will further add value to this initial set of PAMs. Moreover, the provision of information on the situation of other important commodities, the expansion of the coverage in terms of commodity will allow to consider a larger number of crop alternatives at farm level and for different types of land, an important element in policy formulation. A regular update of the data inputted in this first set of PAMs will allow monitoring the impact of policy and market environment changes on the performance of the selected systems.

Rather than providing a definitive answer to issues raised by decision makers, **this study should be rather considered as the starting point of an iterative process between policy analysts and decision makers**. In the current context, where Syrian private entrepreneurs (including farmers) have an increasing weight in the allocation of resources for agricultural production, their participation in this process is crucial.

References

Cummins G., 2000, Final Report on Livestock Sub-Sector, Project GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Fiorillo C. and Vercueil J., 2003, Syrian agriculture at the crossroads, FAO Agricultural Policy and Economic Development Series No. 8, FAO, Rome

Forni F., 2001, Final Report on Land Tenure Systems Structural Features and Polices, Project GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Grad G. and al., 2001, Supply Chain Co-ordination and Policy Implications: The Case of Dairy and Red Meat Products in Syria, Research report by Team 7, GCP/SYR/006/ITA Field Document FAO, Damascus,

Lançon F. and Fok M., 2003, Comparative Advantage Study, Report on the 1st Mission of CIRAD's International experts 28 September – 18 October 2003, GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Lançon F., 2004, Comparative Advantage Study, 2nd progress report CIRAD's International experts mission 29 November 20 December 2003, GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Lançon F., 2004, Comparative Advantage Study, 3rd progress report CIRAD's International experts mission 26 March – 9 April 2004, GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Lançon F., 2004, Comparative Advantage Study, 4th progress report CIRAD's International experts mission, 28 June – 02 July 2004, GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Malevolti, I. 1999, Final Report on Olive and Olive Oil Sub-Sector, Project GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Master, W.A., 2003, Policy measurement for Trade Negotiations and Domestic Reforms, presented at a panel on Concept and Measurement in International Competitiveness at the International Industrial Organization Conference, Northeastern University April 2003, 17 p.

Monke A and Pearson R., 1989, The Policy Analysis matrix for Agricultural Development, Cornell University Press, Ithaca.

Schiffler M., 1998, The Economic of Groundwater Management in Arid Countries: theory, International Experience and a Case Study of Jordan, Frank Cass Publishers, London.

Varela-Ortega C. and Sagardoy, J.S., 2000, Final Report on Agricultural Water Use, Project GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Westlake, M., 2000, Final Report on Citrus Sector, Project GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Westlake, M., 2001, Final Report On Strategic Crops' Sub-Sector, Project GCP/SYR/006/ITA Assistance in Institutional Strengthening and Agricultural Policy, FAO, Damascus

Yassin F. and al., 2003, Economic Incentives and Policy Options for Sustainable Water Use in Agriculture: The Case of Al-Khabour Basin, Syria, Training Report Team 3, GCP/SYR/006/ITA FAO, Damascus,

Appendix A. Computation of cropped area per water management technology.

A major issue in differentiating the different cropping systems was to assess the respective share of network irrigation, well irrigation and rainfed based systems. Agricultural statistics provides either data for rainfed and irrigated area per crop without differentiating between well and network irrigation, or data for network and well irrigated at governorate level without differentiating by crops. In the case of cotton, CMO provided a set of data on cotton cropped area by irrigation technique for the major cotton producing area. For wheat the respective share of each system was deducted from existing dataset along the following rationale.

The first step was to assess the share of potential competing crop for network irrigated wheat, aside from cotton, based on agricultural statistics. Assuming that only strategic crops will have access to network irrigation, the only alternative to wheat and cotton production found was Sugar beat that mobilizes a negligible share of the available network irrigated area (Table I). Table I indicates that 82% of the irrigated crops are located in 5 governorates: Aleppo, Al-Rakka, Deir-ez-Zor, Hama and Hassakeh, therefore the respective share of soft wheat and durum wheat cropped under network or well irrigation can be estimated on the irrigated land allocation in these five provinces. Using the data provided by CMO for network and well irrigated cotton it was possible to compute the remaining areas for these two types of irrigated land that are available for soft and durum wheat. To further allocate the balance we presume that network irrigated land would be primarily allocated to, first soft wheat and second to durum wheat because the latter type is less sensitive to water stress. However, given the high prevalence of network irrigated durum wheat in the Gross Margin data collected by the Farming System Study, it was also presumed that at least 15% of irrigated durum wheat will be cropped under network irrigation conditions. The combination of these information and decision rules lead to the estimation of cropped area under network irrigation for each crop through successive iterations (Table II) with a share under network irrigation of 37%, 74% and 42% for respectively cotton, soft wheat and durum wheat.

In the case of cotton, the integrated PAM values was therefore equivalent to 37% of the PAM 01 (01 PAM lint cotton netw irr large ginery) and 63% of the PAM 02 (02 PAM lint cotton well irr large ginery).

For wheat, agricultural statistics indicate that, for the 1998 to 2001 period, rainfed production account for 37% of the total soft wheat total production and for 32% of durum wheat. To assess the share of each PAMs in the integrated wheat PAMS another adjustment was necessary to take into account the mixing of soft and durum wheat for flour making by GECPT; for one ton of wheat, the usual ratio is of 75% of soft wheat and 25% of durum wheat. Therefore the initial distribution of soft wheat and durum wheat production among network irrigated, well irrigated and rainfed was adjusted accordingly. Table I indicates the final weighting coefficients retained to build an integrated PAM for the public wheat flour commodity system. Since wheat pasta are only made from durum wheat, the coefficients retained for the integrated Wheat pasta PAMs were 31%, 37% and 32% for network irrigated, well irrigated and rainfed based system respectively.

Table I : Area per irrigation technique and major irrigated crop ('000 ha year 2001)

Governorate	Total Irrigated	Area per irrigation system		Major Crop under irrigation				Total	% of total major crop area under irrigation	% of network irrigated area
		Well	Network	Cotton	Sugar beet	Durum	Soft wheat			
Aleppo	**172**	**88**	**84**	**38**	**2**	**35**	**59**	**134**	**14%**	**159%**
Al-Rakka	**166**	**61**	**105**	**64**	**1**	**43**	**42**	**150**	**16%**	**142%**
Damascus	65	49	16	1	0	10	3	13	1%	81%
Dar'a	28	10	18	0	0	13	0	13	1%	72%
Deir-ez-Zor	**107**	**40**	**66**	**22**	**0**	**22**	**38**	**83**	**9%**	**125%**
Hama	**140**	**84**	**87**	**20**	**4**	**75**	**5**	**103**	**11%**	**118%**
Hassakeh	**431**	**340**	**90**	**105**	**0**	**151**	**131**	**387**	**41%**	**428%**
Homs	45	29	16	1	1	19	3	24	3%	148%
Idleb	46	38	8	6	1	17	6	31	3%	393%
Lattakia	35	2	33	0	0	0	0	0	0%	0%
Quneitra	4	2	3	0	0	2	0	2	0%	70%
Tartous	26	9	17	0	0	3	5	8	1%	51%
Total	1 266	752	545	257	9	389	294	948	100%	

Source: NAPC database.

TableII : Estimation of network irrigated share of total irrigated area per crop.

Governorate	Total irr	Well	Network	Cotton	Soft wheat	Durum	Total need	Tot need /net	Cot net	Cot well	Sof net	Sof well	Dur net	Dur well	% net cot	% net sof	% net dur
	NAPC	NAPC	NAPC	NAPC	NAPC	NAPC			CMO	CMO							
	a	b	c	d	e	f	g= d+e+f	h=g/c	i	j	k	l	m	n	o =i/d	p =k/e	q =m/f
Aleppo	172	88	84	38	59	35	132	157%	17	21	59	0	8	27	44%	101%	23%
Al-Rakka	166	61	105	64	42	43	148	141%	38	26	42	0	25	18	60%	100%	59%
Deir-ez-Zor	107	40	66	22	38	22	83	125%	16	6	38		12	10	73%	100%	54%
Hama	140	84	87	20	5	75	100	114%	13	7	5	0	69	6	64%	100%	93%
Hassakeh	431	340	90	105	131	151	387	428%	8	97	60	71	22	129	8%	46%	15%
Total	1 016	613	434	249	275	326	850	196%	92	157	204	71	136	190	**37%**	**74%**	**42%**

Appendix B. Computation of coefficient of decomposition.

Rate of return market	0.08

Equipment depreciation

Item	Equipment value	Annual capacity	Capacity needed for activity	Unit of capacity	Life time (year)	Used up portion	Residual value	Ad valorem duty	Fixed duty	Financial cost and import tax	Depreciation
Tractor	450 000	856	856	hour	15	100%	100 000	1.70%		21 493	27 397
						100%				0	0
						100%				0	0
Total										21 493	27 397

Coefficients of decomposition

	Value at market price	Coefficients L NQ	Coefficients L Q	Coefficients K	Coefficients TI	Value L NQ	Value L Q	Value KI	Value TI	Check
Fixed costs										
Equipment cost TI depreciation	27 397				1	0	0	0	27 397	1
Equipment cost Financial	21 493			1		0	0	21 493	0	1
Variable costs										
Driver	49 933	1.00				49 933	0	0	0	1
Maintenance labor	6 000		1.00			0	6 000	0	0	1
Spare parts	12 000	0.05	0.05	0.10	0.80	600	600	1 200	9 600	1
Fuel	41944	0.05	0.05	0.10	0.80	2 097	2 097	4 194	33 555	1
Total	158 767	0.33	0.05	0.17	0.44	52 630	8 697	26 888	70 552	1

Weighted ad-valorem duty

	share of TI	Duty	Weighted duty
Fuel	48%	-41%	-19%
Spare parts	14%	2%	0%
Equipment cost TI depreciation	39%	1.70%	1%
Total Weighted coef. for custom duty			-0.19

Coefficients applied in the PAM budget

Computations sequence

Appendix C. Estimation of implicit subsidy on fuel

One of the major adjustments was done for the direct or indirect consumption of fuel. A proxy for the opportunity cost of the fuel locally produced was computed using the prevailing average world price for crude oil (30 USD per barrel for 2003, the reference year of the PAMs computed) and a conversion rate to take into consideration the refining costs[10]. On the bases of these data the parity price for Diesel would be of 12.22 SP per liter, while the private price was 7 SP per liter. It means that instead of selling the fuel produced at 12.22 SP, the Syrian economy gets only 7 SP per liter and therefore provides a subsidy of 5.22 SP per liter to Syrian fuel consumers, equivalent to 43% of the parity price.

Computation of the subsidy content in Diesel price

Product form and market reference	Price		
	Value	Currency	Unit
Crude oil world price	30.00	USD	Per barrel
	0.19	USD	Per liter
Conversion ratio from crude oil to diesel	1.25		
Diesel world price	0.24	USD	per liter
USD to SP exchange rate	51.50	SP	
Diesel parity price	12.22	SP	per liter
Market price in Syria	7.00	SP	per liter
Subsidy content from parity price	43%		

[10] Based on data from the Singaporean refining industry and market published by the Ministry of Finance of New Zealand - http://www.med.govt.nz/ers/oil_pet/prices/index.html .

Appendix D. Estimation of gravitational network irrigation cost per ha and per year.

Disaggregation for variable cost

Rate of return market 0.07

Equipment depreciation

Item	Equipment value	Annual capacity	Capacity needed for activity	Unit of capacity	Life time (year)	Used up portion	Residual value	Ad valorem duty	Fixed duty	Financial cost and import tax	Depreciation
network establishment	100 807	1	1	ha	50	100%	0	0%		106	2 016
Machines/doors	3254	1	1	ha	20	100%		1.70%		7	160
						100%				0	0
Total										113	2 176

Coefficient of disaggregation

	Value at market price	Coefficient				Value				Coefficient check	Custom duty		
		L NQ	L Q	K	TI	L NQ	L Q	KI	TI		Ad valorem	Wheight	Wheighted
Fixed cost													
Equipment cost TI depreciation	2 176				1	0	0	0	2 176	1	0.017	0.398	0.007
Equipment cost Financial	113			1		0	0	113	0	1			
Variable cost													
Labor	1 259	1				1 259	0	0	0	1			
Equipment maintenance	774	0.1	0.3	0.2	0.4	77	232	155	310	1	0.02	0.057	0.001
Network maintenance	1 479	0.4	0.1	0.3	0.2	592	148	444	296	1	0.02	0.054	0.001
Electricty	2927	0.01	0.03	0.04	0.92	29	88	117	2 693	1	-0.13	0.492	-0.064
Pumping	80	0.01	0.03	0.04	0.92	1	2	3	74	1	-0.40	0.014	-0.005
Other cost	144	0.2	0.2	0.3	0.3	29	29	43	43	1	0.10	0.008	0.001
Total	8 729	**0.22**	**0.05**	**0.09**	**0.63**	1 958	468	829	5 474	1			-6%

Appendix E. PAM spreadsheet example

Policy Analysis Matrix for representative system

MAIN FINAL OUTPUT lint cotton
SYSTEM network irrigated cotton large ginery
REFERENCE YEAR 2001-2002
VERSION July 2004

---------- Irrigation ----------			
Total cost	Ratio to nominal	Applied ratio	Social in PAM
9000	2.571	2.6	9378

1	Wages Discrepancies MO-NQ (Unskilled labor) [Wage at social price/wage at market price]
26.0%	Taxes MO-Q (on skilled labor) [% employees contribution and other taxes imposed on workers in the formal sector]
0%	Taxes on K (capital) [% subsidies = -%, % taxe = +%]
	Taxes sur IE (les tradables inputs): [at import]
	ad valorem [% on value CIF]
	fixed [amount by unit of product]
1	Discrepancy Exchange rate: [equilibrium exchange rate (reference rate)/nominal exchange rate (market exchange rate)]

BUDGET #1 - FARM LEVEL

FARM MAIN OUTPUT raw cotton
LENGTH OF PRODUCTION CYCLE 8months
Budget #1 computed in sp by Ha of raw cotton

CURRENCY sp
PRODUCTION UNIT ton

AREA MEASUREMENT UNIT Ha
PLOT SIZE 1

B1 FIXED INPUT	Life Time	Used up Value	Capital Cost Market	Capital Cost Social	Initial Cost	Salvage Value	Capital Recovery rate	Mkt L NQ	Mkt L Q	Mkt K	Mkt TI	TOTAL Market Price	Soc L NQ	Soc L Q	Soc K	Soc TI	TOTAL Social Price
		1	5.5%	3.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
		1	0.0%	0.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
TOTAL								0	0	0	0	0	0	0	0	0	0

Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	TI ad valorem	TI fixed	Exch. Rate	Price Before Tax	Salvage Value Before Tax	Coef Capital Recovery rate	Initial disaggregation of equipment L NQ	L Q	K	TI	Control TOTAL
1	26%	0%	0%	0	1	0	0	0.000	0.00	0.00	0.00	0.00	0.00
1	26%	0%	0%	0	1	0	0	0.000			1.00		1.00
								social price	(before depreciation and import taxes)				

BUDGET #1 - FARM LEVEL

B1 DIRECT LABOR	Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Mkt L-NQ	Mkt L-Q	Mkt K	Mkt TI	TOTAL Market Price	Soc L-NQ	Soc L-Q	Soc K	Soc TI	TOTAL Social Price
Land preparation	hours	32	5	1	156	1.00	1.00				156	1.00	0.00			156
Leveling	hours	35	0	1	8	1.00	1.00				8	1.00	0.00			8
Other	hours		0	1	0	1.00	1.00				0	1.00	0.00			0
Sowing & planting	hours	17	50	1	862	0.87	1.00				862	1.00	0.00			862
Fertilization	hours	25	11	1	266	0.87	1.00				266	1.00	0.00			266
Chemicals	hours	45	1	1	42	0.62	1.00				42	1.00	0.00			42
Irrigation	hours	24	122	1	2938	0.76	1.00				2938	1.00	0.00			2938
Weeding	hours	21	230	1	4902	0.81	1.00				4902	1.00	0.00			4902
Harvesting	hours	25	697	1	14810	0.00	1.00				14810	1.00	0.00			14810
Post-harvesting	hours	91	4	1	332	0.00	1.00				332	1.00	0.00			332
		0	0	0	0	0.00	1.00				0	1.00	0.00			0
TOTAL				1019.3308			24313	0	0	0	24313	24313	0	0	0	24313

Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	TI ad valorem	TI fixed	Exch. Rate
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1

BUDGET #1 - FARM LEVEL

B1 INTERMEDIATE INPUT	Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Mkt L-NQ	Mkt L-Q	Mkt K	Mkt TI	TOTAL Market Price	Soc L-NQ	Soc L-Q	Soc K	Soc TI	TOTAL Social Price
Seed/Seeding	kg	12	154.5	1	1810	0.66	0.05	0.05	0.10	0.80	1810	0.05	0.04	0.10	0.79	1768
Manure	kg	650	0.2	1	110	0.66	0.07	0.05	0.17	0.72	111	0.07	0.04	0.17	0.71	109
Chemical fertilizers	kg		0.0	1	0	0.66	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
Nitrogen	kg	12	684.9	1	6857	0.66	0.05	0.05	0.10	0.80	6857	0.05	0.04	0.10	0.79	6696
Phosphate	kg	9	206.2	1	1864	0.66	0.05	0.05	0.10	0.80	1864	0.05	0.04	0.10	0.79	1820
Potash	kg	12	6.9	1	83	0.66	0.05	0.05	0.10	0.80	83	0.05	0.04	0.10	0.79	81
Other (liquid)	kg	12	20.2	1	250	0.66	0.05	0.05	0.10	0.80	250	0.05	0.04	0.10	0.79	244
Chemicals	kg		0.0	1	0	0.50	0.05	0.05	0.10	0.80	0	0.05	0.04	0.10	0.00	0
Pesticides	kg	661	0.8	1	525	0.50	0.05	0.05	0.10	0.80	525	0.05	0.04	0.10	0.79	512
Herbicides	kg	528	1.8	1	930	0.50	0.05	0.05	0.10	0.80	930	0.05	0.04	0.10	0.79	908
Fungicides	kg	86	0.9	1	77	1.00	0.05	0.05	0.10	0.80	77	0.05	0.04	0.10	0.79	75
Machinery:				1	0	1.00				0.00	0	0.00	0.00	0.00	0.00	0
Tillage	Hours	274	8.08	1	2215	1.00	0.33	0.05	0.17	0.45	2215	0.33	0.04	0.17	0.55	2411
Leveling	Hours	280	3.84	1	1075	1.00	0.33	0.05	0.17	0.45	1075	0.33	0.04	0.17	0.55	1170
Other	Hours	312	0.66	1	207	1.00	0.33	0.05	0.17	0.45	207	0.33	0.04	0.17	0.55	226
Sowing & planting	Hours	225	0.62	1	140	0.66	0.33	0.05	0.17	0.45	140	0.33	0.04	0.17	0.55	152
Fertilizer appl. 1	Hours	248	31.33	1	7782	0.66	0.33	0.05	0.17	0.45	7782	0.33	0.04	0.17	0.55	8471
Fertilizer appl. 2	Hours			1	0	0.66	0.33	0.05	0.17	0.45	0	0.33	0.04	0.17	0.00	0
Fertilizer appl. 3	Hours			1	0	0.66	0.33	0.05	0.17	0.45	0	0.33	0.04	0.17	0.00	0
Manure application	Hours	500	0.30	1	152	0.66	0.33	0.05	0.17	0.45	152	0.33	0.04	0.17	0.55	165
Herbicide application	Hours	83	5.27	1	436	0.50	0.33	0.05	0.17	0.45	436	0.33	0.04	0.17	0.55	474
Insecticide application	Hours	187	0.36	1	68	0.50	0.33	0.05	0.17	0.42	68	0.33	0.04	0.17	0.55	74
Harvesting	Hours	1250	0.07	1	89	0.00	0.33	0.05	0.17	0.45	89	0.33	0.04	0.17	0.55	97
Packing and loading	Hours	375	0.12	1	45	0.00	0.33	0.05	0.17	0.45	45	0.33	0.04	0.17	0.55	49
Transport costs	Hours	730	15.00	1	10950	0.00	0.33	0.05	0.17	0.45	10950	0.33	0.04	0.17	0.55	11919
Animal Draft	Day	78	0.58	1	46	1.00	0.40	0.00	0.30	0.30	46	0.40	0.00	0.30	0.29	46
Packing	SP	84	24.23	1	2040	1.00	0.05	0.05	0.05	0.85	2040	0.05	0.04	0.05	0.69	1689
Transport	SP	575	8.81	1	5064	0.00	0.33	0.05	0.17	0.45	5064	0.33	0.04	0.17	0.56	5612
Water Requirements				1	0	1.00					0	0.00	0.00	0.00	0.00	0
Irrigation 1	feddan	3500	1	1	3500	0.33	0.22	0.05	0.09	0.64	3500	0.57	0.10	0.23	1.77	3376
Water value	SP/cm	3	11500.00	1	34500	0.33	0.00	0.00	0.00	0.00	0	0.00	0.00	1.00	0.00	34500
Land rent	SP/HA	7577	1.00	1	7577	1.00	0.00	0.00	1.00	0.00	7577	0.00	0.00	1.44	0.00	10938
Other1		121	1.53	1	184	1.00	0.30	0.20	0.20	0.30	184	0.30	0.16	0.20	0.29	178
Other2		6	0.30	1	2	1.00	0.30	0.20	0.20	0.30	2	0.30	0.16	0.20	0.29	2
		0	0	0	0	1.00				0.00	0	0.00	0.00	0.00	0.00	0
Interest on Revolving Fund	at market	5.5%	35432	0.67	1226				1.00		1226			0.00		0
	at social	3.0%	60721	0.67	1014				0.00		0			1.00		1014
TOTAL		rate	amount	year			10887	2361	15327	26740	55313	12119	2091	53478	32986	100673

100673

Item	Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	TI ad valorem	TI fixed	Exch. Rate
Seed/Seeding	1	26%	0%	1.7%	0	1
Manure	1	26%	0%	1.7%	0	1
Chemical fertilizers	1	26%	0%	1.7%	0	1
Nitrogen	1	26%	0%	1.7%	0	1
Phosphate	1	26%	0%	1.7%	0	1
Potash	1	26%	0%	1.7%	0	1
Other (liquid)	1	26%	0%	1.7%	0	1
Chemicals	1	26%	0%	1.7%	0	1
Pesticides	1	26%	0%	1.7%	0	1
Herbicides	1	26%	0%	1.7%	0	1
Fungicides	1	26%	0%	1.7%	0	1
Machinery:	1	26%	0%	-18.0%	0	1
Tillage	1	26%	0%	-18.0%	0	1
Leveling	1	26%	0%	-18.0%	0	1
Other	1	26%	0%	-18.0%	0	1
Sowing & planting	1	26%	0%	-18.0%	0	1
Fertilizer appl. 1	1	26%	0%	-18.0%	0	1
Fertilizer appl. 2	1	26%	0%	-18.0%	0	1
Fertilizer appl. 3	1	26%	0%	-18.0%	0	1
Manure application	1	26%	0%	-18.0%	0	1
Herbicide application	1	26%	0%	-18.0%	0	1
Insecticide application	1	26%	0%	-18.0%	0	1
Harvesting	1	26%	0%	-18.0%	0	1
Packing and loading	1	26%	0%	-18.0%	0	1
Transport costs	1	26%	0%	-18.0%	0	1
Animal Draft	1	26%	0%	1.7%	0	1
Packing	1	26%	0%	23.5%	0	1
Transport	1	26%	0%	-18.0%	0	1
Water Requirements	1	26%	0%	0.0%	0	1
Irrigation 1	1	26%	0%	-8.0%	0	1
Water value	1	26%	0%	0.0%	0	1
Land rent	1	26%	0%	0.0%	0	1
Other1	1	26%	0%	1.7%	0	1
Other2	1	26%	0%	1.7%	0	1
	1	26%	0%	0%	0	1
Interest at market	1	26%	0%	0%	0	1
Interest at social	1	26%	0%	0%	0	1

BUDGET #1 - FARM LEVEL

B1 REVENUES	Unit	Price	Quantity	TOTAL	Mkt L-NQ	Mkt L-Q	Mkt K	Mkt TI	TOTAL Market	Soc L-NQ	Soc L-Q	Soc K	Soc TI	TOTAL Social
raw cotton	ton	13210	3.8	50198					50198					72594
by product	kg	80	3.9	313					313					313
				0					0					0
TOTAL REVENUES									50511					72907
TOTAL COST					35200	2361	15327	26740	79616	36432	2091	53478	32966	124986
PROFIT (BEFORE TAXES)									-29105					-52079
B1 DIRECT TAXES				0					0					
				0					0					
TOTAL									0					
PROFIT (AFTER TAXES)									-29105					

BUDGET #2 - POST-HARVEST ACTIVITY FARM TO PROCESSOR

SYSTEM network irrigated cotton large ginery

MAIN OUTPUT raw cotton
LENGTH OF PRODUCTION CYCLE
Budget #2 computed in sp by ton of raw cotton

CURRENCY sp
PRODUCTION UNIT ton

CONVERSION RATE
MAIN OUTPUT 1.000
BY-PRODUCT 1.000
Losses (%) 0.0%

B2 FIXED INPUT	Life-Time	Used up Value	Capital Cost Market	Capital Cost Social	Initial Cost	Salvage Value	Capital Recovery rate	Market L NQ	Market L Q	Market K	Market TI	TOTAL Market Price	Social L NQ	Social L Q	Social K	Social TI	TOTAL Social Price
	0	1	5.5%	3.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
	0	1	5.5%	3.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
TOTALS								0	0	0	0	0	0	0	0	0	0

Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	TI ad valorem	TI fixed	Exch. Rate	Price Before Tax	Salvage Value Before Tax	Cost Capital Recovery rate	Initial disaggregation of equipment L NQ	L Q	K	TI	Control TOTAL
1	26%	0%	0%	0	1	0	0	0.000			1.00		1.00
1	26%	0%	0%	0	1	0	0	0.000			1.00		1.00
								social price	(before depreciation and import taxes)				

BUDGET #2 - POST-HARVEST ACTIVITY FARM TO PROCESSOR

B2 DIRECT LABOR	Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Market L-NQ	Market L-Q	Market K	Market TI	TOTAL Market Price	Social L-NQ	Social L-Q	Social K	Social TI	TOTAL Social Price
		0	0	0	0	1.00	1.00				0	1.00	0.00			0
		0	0	0	0	1.00	1.00				0	1.00	0.00			0
TOTAL							0	0	0	0	0	0	0	0	0	0

Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	TI ad valorem	TI fixed	Exch. Rate
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1

BUDGET #2 - POST-HARVEST ACTIVITY FARM TO PROCESSOR

B2 INTERMEDIATE INPUT	Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Market L-NQ	Market L-Q	Market K	Market TI	TOTAL Market Price	Social L-NQ	Social L-Q	Social K	Social TI	TOTAL Social Price
		0	0	0	0	1.00				1.00	0	0.00	0.00	0.00	0.00	0
		0	0	0	0	1.00				1.00	0	0.00	0.00	0.00	0.00	0
		0	0	0	0	1.00				1.00	0	0.00	0.00	0.00	0.00	0
Interest on Revolving Fund	at market	5.5%	13210	0	0				1.00		0			0.00		0
	at social	3.0%	19104	0	0				0.00		0			1.00		0
TOTAL		rate	amount	year			0	0	0	0	0	0	0	0	0	0

Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	TI ad valorem	TI fixed	Exch. Rate
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1
1	26%	0%	0%	0	1

BUDGET #2 - POST-HARVEST ACTIVITY FARM TO PROCESSOR

B2 COMMODITY IN PROCESS	Units	Pric	Quant	TOTAL		TOTAL Market	TOTAL Social
raw cotton	ton	13210	1	13210	1.00	13210	19104
					0.00		
TOTAL						13210	19104

BUDGET #2 - POST-HARVEST ACTIVITY FARM TO PROCESSOR

B2 REVENUES	Unit	Price	Quantity	TOTAL	Market L-NQ	Market L-Q	Market K	Market TI	TOTAL Market	Social L-NQ	Social L-Q	Social K	Social TI	TOTAL Social
raw cotton	ton	13210	1	13210					13210					19104
		0	1	0					0					0
		0	0	0					0					0
TOTAL REVENUES									13210					19104
TOTAL COST					0	0	0	0	13210	0	0	0	0	19104
PROFIT (BEFORE TAXES)									0					0
B2 DIRECT TAXES				0					0					
				0					0					
TOTAL									0					
PROFIT (AFTER TAXES)									0					

BUDGET #3 - POST-HARVEST ACTIVITY PROCESSING

SYSTEM network irrigated cotton large ginery

MAIN OUTPUT: lint cotton
LENGTH OF PRODUCTION CYCLE: 12 minutes
Budget #3 computed in: sp by ton of lint cotton

CURRENCY: sp
PRODUCTION UNIT: ton

CONVERSION RATE
MAIN OUTPUT: 0.32
BY-PRODUCT: 0.630
Losses (%): 0.0%

CAPACITY: 56160
CAPACITY UTILISATION: 100%

B3. FIXED INPUT	Life Time	Used up Value	Capital Cost Market	Capital Cost Social	Initial Cost	Salvage Value	Capital Recovery rate	Market L-NQ	Market L-Q	Market K	Market Ti	TOTAL Market Price	Social L-NQ	Social L-Q	Social K	Social Ti	TOTAL Social Price
BUILDING	50	1	5.5%	3.0%	1996	0	0.059	0.10	0.03	0.79	0.08	118	0.15	0.04	0.64	0.15	59
MACHINE	20	1	5.5%	3.0%	557	0	0.084	0.03	0.03	0.47	0.47	47	0.04	0.03	0.33	0.60	37
GENERATOR	20	1	5.5%	3.0%	891	0	0.084	0.03	0.03	0.47	0.47	75	0.04	0.03	0.33	0.60	56
Cars normal	15	1	5.5%	3.0%	55	0	0.100	0.03	0.03	1.07	0.47	5	0.04	0.03	1.00	0.64	7
Cars pick up	15	1	5.5%	3.0%	91	0	0.100	0.03	0.03	1.07	0.47	9	0.04	0.03	1.00	0.64	11
Cars large pick up	15	1	5.5%	3.0%	95	0	0.100	0.03	0.03	1.07	0.47	10	0.04	0.03	1.00	0.64	12
Tractors	25	1	5.5%	3.0%	257	0	0.075	0.03	0.03	1.01	0.42	19	0.03	0.03	1.00	0.56	23
Lifter	25	1	5.5%	3.0%	118	0	0.075	0.03	0.03	1.04	0.39	9	0.03	0.03	1.00	0.56	10
	0	1	0.0%	0.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
TOTALS								17	9	204	69	291	15	7	133	103	217

B3. FIXED INPUT	Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	Ti ad valorem	Ti fixed	Exch Rate	Price Before Tax	Salvage Value Before Tax	Coef Capital Recovery rate	Initial disaggregation of equipment L-NQ	L-Q	K	Ti	Control TOTAL
BUILDING	1	26%	0%	30.0%	0	1	1536	0	0.039	0.30	0.10	0.30	0.30	1.00
MACHINE	1	26%	0%	1.7%	0	1	548	0	0.067	0.05	0.05	0.10	0.80	1.00
GENERATOR	1	26%	0%	1.7%	0	1	876	0	0.067	0.05	0.05	0.10	0.80	1.00
Cars normal	1	26%	0%	14.5%	0	1	48	0	0.084	0.05	0.05	1.00	0.80	1.90
Cars pick up	1	26%	0%	14.5%	0	1	79	0	0.084	0.05	0.05	1.00	0.80	1.90
Cars large pick up	1	26%	0%	14.5%	0	1	83	0	0.084	0.05	0.05	1.00	0.80	1.90
Tractors	1	26%	0%	1.7%	0	1	252	0	0.057	0.05	0.05	1.00	0.80	1.90
Lifter	1	26%	0%	10.0%	0	1	107	0	0.057	0.05	0.05	1.00	0.80	1.90
	1	26%	0%	0%	0	1	0	0	0.000			0.00		0.00

social price (before depreciation and import taxes)

BUDGET #3 - POST-HARVEST ACTIVITY PROCESSING

B3. DIRECT LABOR	Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Market L-NQ	Market L-Q	Market K	Market Ti	TOTAL Market Price	Social L-NQ	Social L-Q	Social K	Social Ti	TOTAL Social Price	Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	Ti ad valorem	Ti fixed	Exch Rate
permanent labour	sp/ton	145.3875	1	1	145	1.00		1.00			145	0.00	0.79			116	1	26%	0%	0%	0	1
casual labour	sp/ton	780.9	1	1	781	1.00	1.00				781	1.00	0.00			781	1	26%	0%	0%	0	1
buildings maintenance	sp/ton	1.125	1	1	1	0.50		1.00			1	0.00	0.79	0.00	0.00	1	1	26%	0%	0%	0	1
machines maintenance	sp/ton	0.5	1	1	1	0.50		1.00			1	0.00	0.79	0.00	0.00	0	1	26%	0%	0%	0	1
furniture maintenance	sp/ton	0.125	1	1	0	0.50		1.00			0	0.00	0.79	0.00	0.00	0	1	26%	0%	0%	0	1
transportation maintenance	sp/ton	0.25	1	1	0	0.50		1.00			0	0.00	0.79	0.00	0.00	0	1	26%	0%	0%	0	1
bags maintenance	sp/ton	52.75	1	1	53	0.50		1.00			53	0.00	0.79	0.00	0.00	42	1	26%	0%	0%	0	1
		0	0	1	0	1.00		1.00			0	0.00	0.79			0	1	26%	0%	0%	0	1
TOTALS							781	200	0	0	981	781	159	0	0	940						

BUDGET #3 - POST-HARVEST ACTIVITY PROCESSING

B3. INTERMEDIATE INPUT	Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Market L-NQ	Market L-Q	Market K	Market Ti	TOTAL Market Price	Social L-NQ	Social L-Q	Social K	Social Ti	TOTAL Social Price	Wages Discrepancies L-NQ	Taxes on L-Q	Taxes on K	Ti ad valorem	Ti fixed	Exch Rate
packing and wrapping materials for seeds	sp/ton	137.6	1	1	138	0.50	0.05	0.05	0.10	0.30	69	0.05	0.04	0.10	0.24	60	1	26%	0%	23.5%	0	1
energy	sp/ton	6.4	1	1	6	0.50	0.01	0.03	0.04	0.92	6	0.01	0.02	0.04	1.06	7	1	26%	0%	-13.0%	0	1
fuel	sp/ton	375.3	1	1	375	0.50	0.05	0.10	0.10	0.75	375	0.05	0.08	0.10	1.25	555	1	26%	0%	-40.0%	0	1
water	sp/ton	12	1	1	12	0.50	0.10	0.10	0.40	0.40	12	0.10	0.08	0.40	0.40	12	1	26%	0%	0.0%	0	1
spare parts	sp/ton	210.1	1	1	210	0.50	0.05	0.05	0.10	0.80	210	0.05	0.04	0.10	0.67	180	1	26%	0%	20.0%	0	1
Stationery materials	sp/ton	16.6	1	1	17	0.50	0.05	0.05	0.10	0.80	17	0.05	0.04	0.10	0.79	16	1	26%	0%	1.0%	0	1
materials transportation	sp/ton	0.1	1	1	0	0.50	0.05	0.05	0.10	0.80	0	0.05	0.04	0.10	0.79	0	1	26%	0%	1.7%	0	1
Different materials	sp/ton	0.2	1	1	0	0.50	0.05	0.05	0.10	0.80	0	0.05	0.04	0.10	0.79	0	1	26%	0%	1.7%	0	1
Transportation of labors	sp/ton	21.7	1	1	22	0.50	0.05	0.05	0.10	0.80	22	0.05	0.04	0.10	0.98	25	1	26%	0%	-18.0%	0	1
reimbursement of transportation costs to farmers	sp/ton	0	1	1	0	0.50	0.05	0.05	0.10	0.80	0	0.05	0.04	0.10	0.00	0	1	26%	0%	-18.0%	0	1
		0	0	1	0	1.00				1.00	0	0.00	0.00	0.00	0.00	0	1	26%	0%	0%	0	1
Interest on Revolving Fund	at market	5.5%	42590	0.25	586				1.00		586			0.00		0	1	26%	0%	0%	0	1
	at social	3.0%	61045	0.25	458				0.00		0			1.00		458	1	26%	0%	0%	0	1
TOTAL		rate	amount	year			39	50	667	532	1297	39	46	538	689	1313						

BUDGET #3 - POST-HARVEST ACTIVITY PROCESSING

B2. COMMODITY IN PROCESS	Unit	Price	Quant	TOTAL		TOTAL Market	TOTAL Social
raw cotton at ginnery gate	ton	13210	3.125	41281	1.00	41281	59699
					0.00		
TOTAL						41281	59699

BUDGET #3 - POST-HARVEST ACTIVITY PROCESSING

B3. REVENUES	Unit	Price	Quant	TOTAL	Market L-NQ	Market L-Q	Market K	Market Ti	TOTAL Market	Social L-NQ	Social L-Q	Social K	Social Ti	TOTAL Social
lint cotton	ton	54075	1	54075					54075					48196
seed	ton	6350	1.96875	12502					12502					12502
waste	ton	14720	0.1	1472					1472					1472
		0	0	0					0					0
TOTAL REVENUES									68049					62170
TOTAL COST					837	288	870	821	43850	835	212	672	792	62170
PROFIT (BEFORE TAXES)									24199					0

B3. DIRECT TAXES		
	0	0
	0	0
TOTAL		0
PROFIT (AFTER TAXES)		24199

BUDGET #4 - POST-HARVEST ACTIVITY PROCESSING TO WHOLESALE

SYSTEM network irrigated cotton large ginnery

MAIN OUTPUT	lint cotton	CURRENCY	sp	CONVERSION RATE	
LENGTH OF PRODUCTION CYCLE		PRODUCTION UNIT	ton	MAIN OUTPUT	1.000
Budget #3 computed in sp by ton of lint cotton				BY-PRODUCT	1.000
				Losses (%)	0.0%

B4 FIXED INPUT	TOTAL ANNUAL CAPITAL COST: Life-Time	Used up Value	Capital Cost Market	Capital Cost Social	Initial Cost	Salvage Value	Capital Recovery rate	Disaggregation at market price: L NO	L Q	K	TI	TOTAL Market Price	Disaggregation at social price: L NO	L Q	K	TI	TOTAL Social Price
	0	1	0.0%	0.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
	0	1	0.0%	0.0%	0	0	0.000	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0
TOTALS								0	0	0	0	0	0	0	0	0	0

Wages Discrepancies L-NO	Taxes on L-Q	K	TI ad valorem	TI fixed	Exch. Rate	Price Before Tax	Salvage Value Before Tax	Coef Capital Recovery rate	Initial disaggregation of equipment L NO	L Q	K	TI	Control TOTAL
1	25%	0%	0%	0	1	0	0	0.000			1.00		1.00
1	25%	0%	0%	0	1	0	0	0.000			1.00		1.00
								social price	(before depreciation and import taxes)				

BUDGET #4 - POST-HARVEST ACTIVITY PROCESSING TO WHOLESALE

B4 DIRECT LABOR	Budget information: Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Disaggregation at market price: L-NO	L-Q	K	TI	TOTAL Market Price	Disaggregation at social price: L-NO	L-Q	K	TI	TOTAL Social Price
		0	0	0	0	1.00	1.00				0	1.00	0.00			0
		0	0	0	0	0.00	1.00				0	1.00	0.00			0
TOTALS							0	0	0	0	0	0	0	0	0	0

Wages Discrepancies L-NO	Taxes on L-Q	K	TI ad valorem	TI fixed	Exch. Rate
1	25%	0%	0%	0	1
1	25%	0%	0%	0	1

BUDGET #4 - POST-HARVEST ACTIVITY PROCESSING TO WHOLESALE

B4 INTERMEDIATE INPUT	Budget information: Unit	Price	Quantity	Freq	TOTAL	Revolving Fund	Disaggregation at market price: L-NO	L-Q	K	TI	TOTAL Market Price	Disaggregation at social price: L-NO	L-Q	K	TI	TOTAL Social Price
Transportation from ginnery to harbour	sp/ton	391	1	1	391	1.00	0.05	0.05	0.10	0.80	391	0.05	0.04	0.10	0.58	456
		0	0	0	0	0.00				1.00	0	0.00	0.00	0.00	0.00	0
Interest on Revolving Fund	at market	5.5%	54466	0	0				1.00		0			0.00		0
	at social	3.0%	48652	0	0				0.00		0			1.00		0
TOTAL		rate	amount	year			20	20	39	313	391	20	16	39	381	456

Wages Discrepancies L-NO	Taxes on L-Q	K	TI ad valorem	TI fixed	Exch. Rate
1	25%	0%	-18%	0	1
1	25%	0%	0%	0	1
1	25%	0%	0%	0	1
1	25%	0%	0%	0	1

BUDGET #4 - POST-HARVEST ACTIVITY PROCESSING TO WHOLESALE

B4 COMMODITY IN PROCESS	Unit	Price	Quant	TOTAL		TOTAL Market	TOTAL Social
lint cotton	ton	54075	1	54075	1.00	54075	48196
					0.00		
TOTAL						54075	48196

BUDGET #4 - POST-HARVEST ACTIVITY PROCESSING TO WHOLESALE

B4 REVENUES	Unit	Price	Quant	TOTAL	L-NO	L-Q	K	TI	TOTAL Market	L-NO	L-Q	K	TI	TOTAL Social	
lint cotton	ton	54075	1	54075					54075					48652	48652 <===(parity price of main final output)
		0	0	0					0					0	
TOTAL REVENUES									54075					48652	
TOTAL COST					20	20	39	313	54466	20	16	39	381	48652	
PROFIT (BEFORE TAXES)									-391					0	

B4 DIRECT TAXES		TOTAL Market
	0	0
	0	0
TOTAL		0
PROFIT (AFTER TAXES)		-391

TABLE 1. BUDGET SUMMARY **network irrigated cotton large ginery**

July 2004

UNIT Thaousands sp by Ha

	---VALUES AT MARKET PRICE---						---- VALUE SOCIAL PRICE ---						---DIVERGENCES---					
	FARM	Budget #2	Budget #3	Budget #4	POST FARM	Repre. System	FARM	Budget #2	Budget #3	Budget #4	POST FARM	Repre. System	FERME	Budget #2	Budget #3	Budget #4	POST FARM	Repre. System
1 TOTAL REVENUES	106	50	83	66	83	138	73	73	76	59	76	76	33	-22	7	7	7	62
Main final ouput	50	50	66	66	66	66	73	73	59	59	59	59	-22	-22	7	7	7	7
By-products	0	0	17	0	17	17	0	0	17	0	17	17	0	0	0	0	0	0
2. TOTAL COST	80	50	53	66	54	83	125	73	76	59	76	129	-45	-22	-22	7	-22	-45
A. Commodity in process		50	50	66	50			73	73	59	73			-22	-22	7	-22	0
(tax+,subsidy-)	-55	0	0	0	0	-55												
B. Tradables	27	0	1	0	1	28	33	0	1	0	1	34	-6	0	0	0	0	-7
C. Domestic Factors	53	0	2	0	2	55	92	0	2	0	2	94	-39	0	0	0	0	-39
Unskilled Labor	35	0	1	0	1	36	36	0	1	0	1	37	-1	0	0	0	0	-1
Skilled Labor	2	0	0	0	0	3	2	0	0	0	0	2	0	0	0	0	0	0
Capital	15	0	1	0	1	16	53	0	1	0	1	54	-38	0	0	0	0	-38
PROFIT BEFORE-TAXES:	26	0	29	0	29	55	-52	0	0	0	0	-52	78	0	29	0	29	107
Direct taxes:	0	0	0	0	0	0												
PROFIT AFTER-TAXES:	-29	0	29	0	29	55							(+=tax,-=subsidy)					

UNIT sp by ton of lint cotton

	---VALUES AT MARKET PRICE---						--- VALUE SOCIAL PRICE ---						---DIVERGENCES---					
	FARM	Budget #2	Budget #3	Budget #4	POST FARM	Repre. System	FARM	Budget #2	Budget #3	Budget #4	POST FARM	Repre. System	FERME	Budget #2	Budget #3	Budget #4	POST FARM	Repre. System
1 TOTAL REVENUES	86851	41281	68049	54075	68049	113619	59957	59699	62170	48652	62626	62883	26895	-18418	5879	5423	5423	50736
Main final ouput	41281	41281	54075	54075	54075	54075	59699	59699	48196	48652	48652	48652	-18418	-18418	5879	5423	5423	5423
By-products	258	0	13974	0	13974	14231	258	0	13974	0	13974	14231	0	0	0	0	0	0
2. TOTAL COST	65474	41281	43850	54466	44269	68462	102785	59699	62170	48652	62666	105752	-37311	-18418	-18320	5814	-18397	-37290
A. Commodity in process		41281	41281	54075	41281			59699	59699	48196	59699			-18418	-18418	5879	-18418	0
(tax+,subsidy-)	-45313			0	0	-45313												
B. Tradables	21990	0	621	313	934	22924	27126	0	792	381	1174	28299	-5136	0	-171	-69	-240	-5376
C. Domestic Factors	43484	0	1975	78	2054	45538	75659	0	1719	74	1794	77453	-32175	0	256	4	260	-31915
Unskilled Labor	28947	0	837	20	857	29804	29960	0	835	20	855	30815	-1013	0	2	0	2	-1011
Skilled Labor	1933	0	268	20	287	2220	1720	0	212	16	228	1948	213	0	55	4	59	272
Capital	12604	0	870	39	910	13514	43979	0	672	39	711	44690	-31375	0	199	0	199	-31176
PROFIT BEFORE-TAXES:	21377	0	24199	-391	23780	45157	-42828	0	0	0	0	-42869	64205	0	24199	-391	23820	88026
Dircet taxes:	0	0	0	0	0	0												
PROFIT AFTER-TAXES:	-23935	0	24199	-391	23808	45157							(positive=tax, negative=subsidy)					

Coefficient Farm /Final Product:	1.216
Coefficient Budget #2 /Final Product:	0.320
Coefficient Post-processing /Final product:	1.000

TABLE 2A: POLICY ANALYSIS INDICATORS

1. FINANCIAL PROFITABILITY	[D = A - B - C]	45 157
2. FINANCIAL COST-BENEFIT RATIO	[C / (A - B)]	0.502
3. SOCIAL PROFITABILITY	[H = E - F - G]	-42 869
4. DOMESTIC RESOURCE COST	[G / (E - F)]	2.240
5. SOCIAL COST-BENEFIT RATIO	[(F + G) / E]	1.682
6. TRANSFERS	[L = I + J + K]	88 026
7. NOMINAL PROTECTION COEFFICIENT (Including by-product)	[A / E]	1.807
7A. NOMINAL PROTECTION COEFFICIENT (Main final output only)	[A* / E*]	2.043
8. EFFECTIVE PROTECTION COEFFICIENT	[(A - B) / (E - F)]	2.622
9. PROFITABILITY COEFFICIENT	[D / H]	-1.053
10. PRODUCERS SUBSIDY RATIO	[L / E]	1.400
11. EQUIV. PRODUCER SUBSIDY	[L / A]	0.775

TABLE 2B: BREAK EVEN POINT

	At Market price		At Social price
		(% of current value)	
Yield:	2.86		6.51
	0.75		*1.71*
FINAL OUTPUT PRICE:	8917.90		91520.68372
	0.16		*1.88*
POST HARVEST COSTS	24364.89		-39901.54
	8.16		*-13.45*
DOMESTIC FACTORS COSTS	90694.93		34583.92
	1.99		*0.45*

TABLE 3A: POLICY ANALYSIS MATRIX

network irrigated cotton large ginery
UNIT: sp par Ha

Version July 2004

	REVENUES	COSTS		PROFITS
		TRADABLES INPUTS	DOMESTIC FACTORS	
PRIVATE PRICES	A 138 160	B 27 875	C 55 374	D 54 911
SOCIAL PRICES	E 76 466	F G 34 412	G 94 182	H -52 128
DIVERGENCES	I 61 694	J -6 537	K -38 808	L 107 039

TABLE 3A: POLICY ANALYSIS MATRIX

network irrigated cotton large ginery
UNIT: sp by ton of lint cotton

Version July 2004

	REVENUES	COSTS		PROFITS
		TRADABLES INPUTS	DOMESTIC FACTORS	
PRIVATE PRICES	A 113 619	B 22 924	C 45 538	D 45 157
SOCIAL PRICES	E 62 883	F 28 299	G 77 453	H -42 869
DIVERGENCES	I 50 736	J -5 376	K -31 915	L 88 026