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Agricultural performance and Policy in Lebanon

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Abstract. This report describes the general macro-economic characteristics of Lebanon, explores the performance of the agricultural sector and identifies some action items that could be implemented to improve the functioning of this important sector. It discusses the main physical, human and macro-economic characteristics of Lebanon, and explored the trends observed through the main economic indicators of the past few years. Also provided was a detailed description of the decomposition of the agricultural sector which included land distribution, technology use, infrastructure, productivity, farm gate and retail prices, and value added ratios for different crops in 1988.

It is clear that the major deficiency in Lebanon is the extremely limited role that the public sector plays in the development of the agricultural sector and in the enhancement of the sector's role in the national economy. Policy instruments are lacking or virtually nonexistent; the fact that the share of agriculture in the Gross Domestic Product remained the same in 1988 as in the pre-war period is largely due to the production of prohibited crops and not to the implementation of effective agricultural policy. It is evident that the agricultural share of the GDP declined in 1989 and 1990 partly due to the registered decreases in the production of illegal crops.

From all that has preceded, it seems that a restructuring and rehabilitation of the Ministry of Agriculture is required in order to render it an efficient and effective policy making body that will be engaged in the development of the agricultural sector. The Ministry of Agriculture can play that role if provided with adequate facilities and qualified personnel. It will also require technical assistance and equipment to assist in its planning and operational functions. In addition, efficient functioning of the National Bank of Agricultural Development is an urgent necessity with regard to agricultural credit. This should be accompanied by land reclamation projects, the rehabilitation and construction of agricultural roads, reservoir construction, and the purchase of agricultural machines. When implemented, these measures will provide the foundation for the continued development of this vital sector of the economy into the coming century.

Introduction

Many Arab nations, namely Egypt, Tunisia, Morocco, Algeria, Sudan and Jordan, have had to adopt economic reforms and structural adjustment programs at the request of major international donors such as the IMF and the World Bank. Such reforms, including the removal of certain food and agricultural subsidies, have often resulted in mass riots and political unrest in many of these countries.

Lebanon, however, has not experienced these problems simply because it has rarely borrowed from international donors and has operated as a free market economy with a minimum amount of intervention. Prices have rarely been subsidized; although there were subsidies for a few food items for a short period which followed the sharp depreciation of the Lebanese pound, these were subsequently removed after it became clear that they did not serve those who were intended to benefit from them.

The original objective of this report was to evaluate specific agricultural and food policies, within the context of the prevailing economic conditions, utilizing a large multi-sector model. However, it was soon discovered that any modelling attempt would be hindered by the lack of reliable data, especially for the agricultural sector. Subsequently, a field survey was conducted (see Section III) which, while yielding some data pertaining to the agricultural sector, was not sufficient to provide the necessary information required for agricultural sector modelling. Because of these restraints, this report instead describes the general macro-economic characteristics of Lebanon, explores the performance of the agricultural sector and identifies some action items that could be implemented to improve the functioning of this important sector.

In Section I, an overview of the Lebanese economy is provided, briefly describing the country's physical, human and macro-economic characteristics. Economic performance indicators such as growth, sectoral developments, public finance and the behavior of inflation, exchange rates, and the balance of payments over the last few years are surveyed. Section II provides a description of the agricultural sector including the distribution of land by area and crop, the level of technology used and the condition of agricultural infrastructure.

Due to the lack of data mentioned earlier, a sample survey was carried out to estimate important variables such as productivity (yield), farm gate prices and value added ratios of some important crops for the year 1988. The results of this survey are presented and analyzed in Section III. Section IV explores the difficulties of modelling the agricultural sector, and Section V identifies appropriate policy alternatives aimed at improving the performance of the agricultural sector. Finally, Section VI concludes this report.

I – Overview of the Economy

1. Country Characteristics

Lebanon enjoys a Mediterranean climate characterized in the summer by relatively hot, humid weather on the coast contrasted with very mild and cool temperatures in the mountains. Winters are generally cool and wet, with average temperatures rarely below 10°C. Despite Lebanon's small area (around 10,450 sq km) and its position on the eastern Mediterranean Sea, the presence of Mount Lebanon causes dramatic climatic variations. Average annual precipitation varies from one region to another; in some arid eastern areas yearly precipitation does not exceed 200 mm, while it is more than 1,500 mm at the peak of Mount Lebanon in the north. These climatic variations lead to the diversified agriculture and multitude of crops which are discussed later in this report.

Lebanon's population was estimated to be around 3.1 million in 1988 and to have grown at 0.4% per year since; the average population density for the same year was estimated to be 270 per sq km. Life expectancy at birth is 65 years and the infant mortality rate is about 4.3%. At one time, general health conditions were among the best in the region and the access to safe water was estimated to be 98% for urban areas and 77% for rural areas. The per capita calorie intake was estimated to be around 3,046 per day and protein intake about 80 grams per day. While these figures may have changed over the years, they are nonetheless indicative of the general human, social and demographic conditions in the country.

2. Macro-economic Characteristics

Before the outbreak of civil war in 1975, the Lebanese economy was experiencing rapid growth that began a quarter of a century earlier. The highest growth rate was reached in the early 1970s when foreign capital, especially from the Arab oil exporting countries, found Lebanon to be a safe haven. During this period, the average rate of growth was around eight% (from 1970-1974), as compared to 7% for the 1950-1974 period. Lebanon was developing at a faster rate than most neighboring countries and had become an important financial center in the region. The high rate of growth was accompanied by low inflation rates which ranged between two and 3%, and the Lebanese balance of payments was in surplus until the early 1980s. The net inflow of capital, mainly remittances from Lebanese working abroad, has historically helped finance the large account deficits characterizing the Lebanese foreign sector.[1]

The turning point in the performance of the Lebanese economy occurred in 1975. Since then, economic and financial developments have been dominated by the armed conflict. According to some estimates, the gross domestic product (GDP) declined by more than 50% in 1976.[2] In addition to the large scale destruction of economic infrastructures, industrial facilities and human resources, Lebanon has experienced a migration of human capital, market segmentation, balance of payments problems, a considerable escalation in the rate of inflation, and a severe depreciation of the Lebanese currency against all major currencies.

Perhaps one of the most important consequences of the war was the emergence of large budget deficits and the accumulation of a huge public debt. Lebanese public debt is now one of the highest in the world

when compared to national income.[3] Fiscal deficits are growing at increased rates and the interest payments on the debt far exceed all government revenues. This deterioration in public sector finances started in 1982, with the weakening of the central government and the subsequent steady decline in revenues.[4] At the same time, government expenditures continued to rise in order to pay wages and salaries, provide certain public services, and subsidize various basic commodities.

The financing of growing budget deficits by the central and commercial banks has been the main cause for the rapid expansion of domestic liquidity; Lebanese financial markets are still at a rudimentary stage and have not permitted the active participation of the public in financing the deficits. Most of the time, the negative real rate of interest has discouraged people from buying treasury bills, explaining to a great extent why the government has resorted to non-market borrowing by requesting banks to hold a large proportion of their deposits in treasury bills. Other broad effects on the financial situation have resulted from external factors related to the political and economic situation, and from internal factors such as management fraud and lack of supervision. As a result, many banks have been considerably weakened and several have failed during the years of conflict.

The increase in liquidity, denominated in domestic currency, coupled with a decline in economic activity and negative expectations, has put pressure on the Lebanese pound and the inflation rate. The pound has depreciated severely in the foreign exchange market and inflation rates have largely followed the movement of the exchange rate due to the openness of the Lebanese economy.

3. Economic Performance Indicators

A. Economic Growth

Analysis of the Lebanese real sector is seriously hampered by the lack of reliable data. The last official national income accounts available are those of 1975 and, currently, statistics on output and prices are compiled mostly by trade and professional associations. Moreover, whenever the armed conflict intensifies, collecting data on a consistent basis becomes virtually impossible.

As mentioned earlier, the civil war that started in 1975 caused fundamental changes to the Lebanese economy. Lebanese production capacity has been greatly affected by the destruction of production facilities, and the obsolescence of existing technologies resulting mainly from the reluctance to invest in new machinery and equipment. Moreover, labor, especially skilled labor, has migrated and the flow of goods and services within the country has frequently been interrupted or made very difficult by the segmentation of domestic markets. Financial instability, characterized by the depreciation of the Lebanese pound and rising inflation rates, led to a reduction in borrowing and investment and therefore to lower rates of growth. GDP in 1980 was estimated to have declined by 40% compared to its 1974 level and, according to the World Bank, it continued to decline by 20 to 25% in 1983 and by 10 to 15% in 1984. In 1985, the GDP reached its lowest estimated level of decline; however, the situation improved significantly in 1986 and 1987.

Contributing to this increase in output, particularly in the industrial sector, were the improved security situation and the decrease in the average cost of production (due mainly to lower real wages resulting from higher inflation rates and the increase in the competitiveness of Lebanese exports abroad caused by the severe depreciation of the Lebanese pound). This improvement continued in 1988, which was considered to be the best year in the last 16 years, where output was estimated to have increased by about 6%. In 1989-1990, however, output is estimated to have declined due mainly to the security situation in Beirut where most economic activity is concentrated. According to the latest estimate, the GDP in 1989 and 1990 stood at 2.6 and 2.5 billion dollars, respectively, as compared to the 1988 GDP estimate of 3.2 billion dollars.[5]

B. Sectoral Developments

Traditionally, the Lebanese economy has been dominated by the service sector, which accounted for up to 70% of GDP prior to 1975. This picture has changed somewhat in recent years as the share of the industrial and agricultural sectors in total domestic production has increased.

The service sector has been affected severely by internal strife and the lessening role of Beirut as a center for finance, commerce and tourism. While the overall service sector is still dominated by commercial and financial services, other activities are beginning to emerge.

It is a well known fact that, during inflation, the number of bank branches and bank employees mushroom. The Lebanese banking sector witnessed increasing activity after the beginning of the depreciation phase of the Lebanese pound, particularly after 1986, resulting largely from speculation and the large gap between the interest rate paid on deposits and the rate received on loans. Generally, when stabilization occurs, inflation disappears, as does the absolute size of the deposit loan rate spread. In Lebanon, there is likely to be a profit squeeze which may jeopardize the financial stability of the system. Mergers and employment reductions generally occur in the immediate aftermath of stabilization.[6] The question of mergers is currently being discussed in Lebanon; a successful monetary policy will keep a close eye on the financial industry.

The industrial sector has also experienced some fluctuations during the last 15 years. The share of the industrial sector in the gross domestic product was estimated to be 20% in 1988 compared to about 15% in 1973. The growth of the industrial sector is due, to a large extent, to the competitiveness of industrial products domestically and abroad. This improvement in competitiveness is mainly the consequence of the substantial reduction in cost associated with lower real wages and the low cost of some inputs such as electricity. The export of industrial products was estimated to represent about 45% of total exports in 1988; during the 1986-1988 period, industrial exports increased by approximately 130% in real terms.

Lebanese industry was hard hit by the 1989-90 military escalation in the area in which most industrial facilities are located. The Lebanese Chamber of Commerce and Industry estimated the reduction in industrial output to be between 30 and 40% during 1990, and the reduction in exports to be around 60%. Other obstacles preventing industry from expanding were the reduction of internal and external demand, the lack of industrial credit (which never was above 8% of total bank credit), the reluctance on the part of the industrialists to modernize machinery and equipment, and the emigration of skilled labor. It is expected that whenever the financial and security situations improve, the industrial sector will take the lead, in terms of growth, for the rest of the sectors.

The agricultural sector's share in total domestic production is believed to have fluctuated between 10% prior to 1975 and around 12% in the late 1980s. The most important factor in promoting the performance of the agricultural sector is the sharp depreciation of the Lebanese pound which has made exports very competitive. Also, the most important agricultural areas have been spared from military conflicts, and many people fleeing the big cities, especially Beirut, have moved to agricultural areas.

On the other hand, the Lebanese agricultural sector is suffering from a number of problems. The risk associated with this sector is extremely high because those agricultural exports destined for many Gulf countries, as well as produce allocated for the domestic market, are subject to a great degree of uncertainty related to security concerns, road closures and political problems. This uncertainty is compounded by the fact that, if not exported or sold domestically, agricultural products cannot be stored or processed because of the lack of adequate storage facilities and the absence of agro-industries which are an important outlet for agricultural products.

In addition, the Lebanese agricultural sector is characterized by the existence of some large monopolies controlling the distribution of agricultural inputs such as seeds, fertilizers and pesticides. At the same time, there are some large wholesale traders controlling about 90% of total agricultural revenues. Thus, farmers pay high prices for the inputs and get lower prices for their output due to these market imperfections. The agricultural sector suffers also from a lack of credit which has become very serious in recent years. Agriculture's share in total bank credit has been less than 2% since 1985 *(Table 1.1)*.

C. Public Finance

With the outbreak of the armed conflict in 1975, the ability of the government to collect taxes was severely curtailed. At the same time, the government tried to maintain some essential public services and subsidize some basic commodities such as gasoline and flour. This has led to huge fiscal deficits which have increased over the years and which have averaged in excess of 80% of total expenditures since 1984 *(Table 1.2)*.

The interest payments on public debt alone have exceeded government revenues every year since 1985; the deficits have been financed primarily by non-market borrowing from the Central Bank and commercial banks which are compelled to subscribe to treasury bills for a certain percentage of their deposits (approximately 60% of total deposits in domestic currency). Bank financing of government deficits has been the main source of growth in Lebanese pound liquidity. The expansion of domestic liquidity rose from 56% in 1985 to 172% in 1986 to a peak of 3,354% in 1987. Since 1987, the growth of liquidity has levelled somewhat to an average of 40% for the 1988-1990 period *(Table 1.3.)*.

The rapid expansion of domestic liquidity, coupled with negative expectations and waning confidence in the Lebanese pound, have contributed to the phenomenon of dollarization. The ratio of foreign currency deposits to total liquidity, which stood at about 15% in 1975, had reached a peak of 80% in 1988 before returning to 77% in 1990 *(Table 1.4)*.

As a consequence, the pound ceased to function as money. It is usually argued that in countries experiencing hyper-inflation (such as Germany in 1922-23), money completely loses its function as a store of value, and partially loses its role as a unit of account, but preserves its function as a medium of exchange. In the case of Lebanon, however, even the latter function has been partially lost though the country did not experience hyper-inflation *per se*. Thus, the overall effects of Lebanon's weak public finances were the domestic increase in money supply, depreciation of the Lebanese pound and galloping inflation rates. Each of these factors is discussed below.

D. Inflation

The sharp and continuous rise in the level of prices in Lebanon was the result of many factors, among them the requirements of domestically financing the budget deficits, which have led to significant inflationary pressure. The resulting excessive domestic liquidity expansion was not matched by an increase in the demand for liquidity mainly because of weak economic activity, low income and lack of confidence in the Lebanese pound. When the public tries to reduce domestic liquidity, upward pressure will be put on the rate of inflation either directly or indirectly via the changes in the exchange rate *(Figures 1 and 2)*. On the supply side, the low productivity, high costs of production stemming mainly from higher transportation costs due to market fragmentation, and the upward adjustment in the profit margin have contributed further to the escalation of prices. This escalation was most noticeable after 1984 and reached a peak level in 1987 when the inflation rate stood at 487%. Subsequently, the annual inflation rate fell to 155% in 1988 and 70% in 1989 and 1990 *(Table 1.5).*

Salary and wage adjustment followed the rate of inflation fairly closely until 1986. After the acceleration of inflation, especially in 1987, the wage rate lagged behind inflation despite three adjustments that year. This led to a decrease in real wage rate and salaries, which averaged about $243 in 1983 and dropped to approximately $41 a month in 1987. The minimum monthly wage was about $90 in 1989 and $60 in 1990, reflecting the severe depreciation of the pound *(Table 1.5)*. The increase in nominal wages led to an increase in prices which in turn led to higher wages and the spiral continues.

E. Exchange Rate

Perhaps one of the most important implications of the political instability and the ensuing economic situation was the severe and protracted depreciation of the Lebanese pound that started in 1982-1983. The three main reasons behind the depreciation of the pound are rapid money growth caused by massive budget deficits, low real rates of interest, and pessimism reflected by negative expectations. The negative expectations factor, exemplified by the phenomenon of currency substitution (dollarization) also explains why the historically stable Lebanese pound has come under extreme pressure, being exchanged at more than LL 100,000 in 1990 as compared to LL 5.5 in 1983 *(Table 1.6)*.

Speculation is another important factor which has influenced the short-term behavior of the exchange rate, its large fluctuations, and volatility. There is little doubt that the economic situation in Lebanon, the resulting structural changes, and the change in "fundamentals" would have led to the depreciation of the pound without the presence of speculation; however, speculation apparently exacerbated the short-term oscillations and volatility of the currency.

In its efforts to stabilize the exchange rate and moderate its short-term fluctuations, the Bank of Lebanon resorted to foreign exchange market intervention. Substantive intervention took place in 1986-1987 and in 1990. Most of the time, intervention was intended to forestall the depreciation of the pound; however, the Central Bank intervened sometimes to prevent a rapid appreciation of the currency so that the competitiveness of exports and domestic financial stability would not be affected.

The interest rate was also used to maintain some order in the foreign exchange market. Raising the rate of interest on treasury bills in the primary and secondary markets was intended to absorb excess domestic liquidity and reduce the pressure on the pound. However, this has led to an increase in interest payments on public debt, further borrowing, and an ultimately larger liquidity. The use of the nominal rate of interest in stabilizing the exchange rate has not been very successful, partially because these rates are artificial and do not correspond to prevailing economic conditions. The rate of interest on treasury bills, set by Ministry of Finance, has been anchoring all other rates in the economy. The Bank of Lebanon has pursued a policy of selling treasury bills to the public out of its own portfolio in the secondary market. The rate paid is determined by the Bank; it is not a variable market rate *(Table 1.7)*. Thus, the rate of interest in Lebanon is not indicative of the economic and market conditions but may reflect partially the situation in the foreign exchange market.

F. The Balance of Payments

While the analysis of the balance of payments is hindered by the availability of reliable data, the trade deficit is estimated to have decreased between 1985 and 1990. This reduction is due largely to a decrease in imports reflecting weak economic activity, a low level of income, and an increase in the cost of imports due to the drop in value of the Lebanese pound. The surge in exports since 1986, was caused mainly by depreciation of the domestic currency and the increased competitiveness of domestic products abroad.

Industrial exports constitute approximately two-thirds of total exports *(Table 1.8).* Lebanese exports are composed primarily of labor-intensive and high value-added products including foodstuffs, jewelry, textiles and leather products *(Table 1.9)*. The export value of agricultural products and processed foodstuffs is thought to have risen in relation to total export value for the 1985-1990 period. Most of Lebanon's exports are destined for the Middle East, particularly Saudi Arabia, Kuwait and Jordan *(Table 1.10)*. Because of the substantial improvement in competitiveness, some of the exports have made their way toward industrial and developed countries. Most imports from developed countries are industrial products, while imports from the Middle East and other developing countries are mainly petroleum and agricultural products *(Table 1.11)*.

In regard to the movement of capital, inflow has been on the decline due to the internal situation as well as to the slowdown of economic activity in the Gulf region which resulted in the reduction in remittances from Lebanese working abroad. The migration of capital rose particularly after the eruption of hostilities in 1989 and 1990 and the consequent diminished confidence in the Lebanese banking sector. It is believed that once the situation stabilizes, most of the capital that was flown out of the country will be returned in view of the fact that the Lebanese banking secrecy code is still intact.

It should be noted that Lebanon is still in the enviable position of having a relatively very low level of foreign debt. While data on external public debt have not been routinely collected, estimates indicate that by the end of 1990, external debt stood at $280 million *(Table 1.12).* Unlike many developing countries, Lebanon does not have problems arising from an inability to service its debt. It is hoped that Lebanon will shy away from external borrowing in light of the experience of many third world countries, even in cases where reconstruction is to take place.

II – Agriculture in Lebanon

1. Introduction

The agricultural sector plays a tertiary role in the developmental pattern of Lebanon. In 1988, the sector accounted for an estimated 10% of Lebanon's gross domestic product as compared to 9.4% in 1972 and

12% in 1965. The percentage of agricultural manpower out of the total labor force has declined substantially in the past two decades. The agricultural sector's share in total bank loans declined from 6.34% in 1964 to 3.82% in 1972, 2.75% in 1982, and to 0.85% in 1988. It should be noted that per capita income in agriculture has increased in recent years despite the continuous decline in the sector's share of total bank loans. The increase in per capita income may be attributable to a variety of reasons which include the increased use of greenhouses (about 450 hectares in 1985), an increase in the area planted with relatively more profitable crops, and an increase in the number of irrigated farm holdings (which amounted to 29,000 in the early eighties).

A wide variety of crops are produced in Lebanon despite the small area of the country. Main crops include wheat, potatoes, onion bulbs, onion seeds, apples, citrus, grapes, bananas, olives, tomatoes, lettuce, muskmelons, watermelons, cucumbers, carnations, roses, peach plums, apricots, lentils, hashish, and opium. Livestock and livestock-derived products include cattle, sheep, goats, pigs, poultry, fish, eggs, and milk. This diversity in crop production is partially attributable to the diversified topography and climactic conditions in the different agricultural regions in the country. *Table 2.1* shows the evolution of gross national agricultural production in Lebanon in current and in constant 1964 prices.

It is clear from the table that there was a serious decline in the value of agricultural products in 1987, in real terms (data from 1972 to 1980 is not available). This was primarily due to the rapid depreciation in the value of the Lebanese pound which subsequently led to the exceptionally high rates of price inflation that were registered during that year.

2. Land Distribution

The Ministry of Agriculture reported in 1970 the following information pertaining to farm holding distribution *(Table 2.2)* and forms of land exploitation *(Table 2.3)*. It is based on an agricultural census that was carried out during that year.

Although for several years there have been no agricultural censuses conducted, a 1987 Hariri Foundation study reported the following distribution of planted areas (out of the total area) of each governorate:

North Lebanon	33.83%
Bekaa	38.54%
Mount Lebanon	8.87%
Nabatiyeh	4.66%
South Lebanon	14.10%

A total area of about 2339 km^2 was actually cultivated in 1987, while about 2494 km^2 of potentially cultivatable land remained idle. This un-cultivated area is distributed among each governorate as follows (percent of total area):

North Lebanon	18.53%
Bekaa	48.58%
Mount Lebanon	10.37%
Nabatiyeh	4.74%
South Lebanon	17.78%

These figures indicate that although the country's crop production potential is constrained by its small size and existing technology, full agricultural production potential has not yet been reached. It should be noted that only about 20% of total agricultural land is manually irrigated; the rest is rainfed.

A. Land Distribution by Major Crops

The main crop production regions are distributed in the country as follows:

- In the narrow coastal strip, the main crops cultivated are citrus fruits, bananas, vegetables grown predominantly in greenhouses, and horticulture products.

- Major crop production in the Akkar plains, including the lower slopes of northern Mount Lebanon, includes cereals, potatoes, grapes, vegetables, endives, tobacco and ground nuts.
- The central Bekaa Valley mainly produces potatoes, sugar beets, vegetables and grains.
- The mountainous region, which is characterized by its steep valleys and fruit trees, has witnessed the recent introduction of greenhouses allowing farmers to produce vegetables, carnations and roses.
- On the slopes surrounding the western side of the Bekaa Valley, grapes are the most important crop. The hills in the south primarily produce olives, cereals, tobacco and almonds.

The evolution of planted areas for different crops from 1965 to 1990 is presented in *Table 2.4*; *Table 2.5* shows the evolution of animal production.

Cereal production, which is essential to economic self-sufficiency, has been on the decline since 1970. Some improvements have been registered since 1988 which may be explained by the increase in revenues arising from these crops. The land area producing legumes (lentils and chick peas) almost doubled in 1990, after remaining almost constant since 1985. These crops are very rich in protein and are considered an important element in the traditional Lebanese diet; they are also important from the food security perspective.

Potatoes, critical to self-sufficiency, are one of the most important crops in Lebanon, accounting for a large portion of the total planted area. Potato production satisfies most local needs and, when prices are favorable, potatoes are exported to other countries. Citrus production plays a major role in the agricultural sector. While Lebanon exports part of its citrus crop to other countries, mainly in the Gulf region, these crops suffered greatly from the turbulent war period, particularly in South Lebanon where there has been continuous armed conflict. Because producers have incurred great losses due to the difficulty in marketing their citrus crops, many have shifted to growing more profitable crops such as bananas.

The prohibited crops are planted mainly in the north of the Bekaa Valley. This region has always been considered to be the traditional area for growing hashish and, recently, opium. It has also been an enclave over which the Lebanese government has had no authority. In 1975, just before the war, the government unsuccessfully tried to destroy these crops and to induce growers to shift to other crops. Prohibited crops were produced at increased rates during the war years, but for the last two years, the planting of these crops has been on the decline. This can be attributed to a price decrease in the world markets and the difficulty of marketing and selling these crops. More importantly, there is reason to believe that tremendous political pressure has been exerted from other countries, recipients of these products, to combat the production of hashish and opium. Also, countries supplying raw materials for drug laboratories in the Bekaa region have stopped doing so for political and tactical reasons.

3. Land Tenure

Most of the farmland holdings in Lebanon are small-sized. It is currently estimated that about 35% of land owners have less than one-half hectare of farmland and that their total holdings amount to only 4% of the total agricultural land. About 45% of farmland owners own less than a hectare each; this accounts for about 9% of the total agricultural area. The FAO estimates that renting, share cropping and mixed forms of land management currently cover about one-half of total agricultural land holdings in Lebanon and that these contracts are predominantly on a seasonal or annual basis. These figures indicate a major change from the pattern that existed in the past.

4. Technology

In the early 1980s, the FAO conducted an extensive study aimed at determining the levels of mechanization in the different agricultural regions of the country. The total number of tractors used in Lebanon was estimated to have been about 2000, a significant proportion of which were used in other sectors as well. The level of mechanization achieved in each farming sector was illustrated by reference to typical cropping situations which, in turn, were, and still are, linked to the agricultural zones as discussed below.

- Rain-fed agriculture is largely confined to the Bekaa Valley where wheat, barley, lentils, and beans are grown as winter crops. Preparation of the land takes place by means of share ploughs and spring time

cultivators, used to a limited extent in secondary cultivation. Seed is spread with spinner broadcasters or by hand.

- Sugar beets and potatoes are grown mainly in the Bekaa Valley where the traditional system of basin irrigation and the generally small size of the plots have provided serious constraints on mechanization to date.
- Orchards and vineyards are cultivated on level or gently sloping areas of the Bekaa Valley. Extensive mechanization includes soil tillage, weed control, complete spray programs and crop transport.
- Deciduous fruit trees are mainly cultivated on narrow terraces in the mountains. Only light garden tractors and portable spray machines have been utilized.
- Citrus and banana cultivation utilizes limited mechanization, largely confined to spraying operations.
- Cultivation of olives includes some use of tractors; spraying is largely mechanized.
- Cultivation of mixed crops (tomatoes, potatoes, winter cereals, tobacco, and groundnuts) employs tractors for soil preparation; use of ploughs and/or rotary cultivators is common. Tractors with trailer transport are often used for crop collection and transport to market.

The level of mechanization in Lebanon is far below the optimal level. It is estimated that one tractor is currently in use for every 165 hectares of cultivated land; an average of one tractor for every 40 hectares (maximum) is required if soil preparation and cultivation are to be fully mechanized.

The constraints on achieving the required levels of mechanization in Lebanese agriculture include the following:

- Shortage of medium- and long-term credit.
- Generally, private institutions supplying tractors and implements do not know what type of tractor is best suited for each agricultural region; consequently, technical advice to farmers has been erroneous.
- Under-utilization of tractors, due to the predominance of small land holdings, has created a situation in which the savings in plowing costs are insufficient to induce farmers to undertake such a large investment.
- Limited number of agricultural cooperatives.
- Land tenure systems which preclude any investment by share croppers or tenants in land improvement.
- Poor access to farms.
- Poor terrace design and orchard layout which limit the use of tractors.
- Outmoded field irrigation.
- Poor land levelling and field drainage.
- Shallow, stony soils in some areas which are liable to damage machinery.
- Limited government assistance in farm mechanization to farmers.

5. Employment

Table 2.6 presents the FAO estimates of the agricultural manpower for 1960 through 1984.

The figures demonstrate that the percentage of the total workforce involved in agriculture has continually decreased since 1960. It is currently estimated that the percentage share has stabilized between seven and 8%.

6. Self-Sufficiency

Given the limited resource availability and existing technology in Lebanon, the goal of achieving self-sufficiency in food production cannot and should not be attempted in the foreseeable future. This is not to suggest that policies designed to improve productivity in the agricultural sector should not be implemented.

Table 2.7 presents the FAO estimates for Lebanon's self-sufficiency ratios for major food items for the years 1970 and 1980.

7. Infrastructure

A. Irrigation Networks and Agricultural Roads

A 1987 Hariri Foundation study reported that out of 1,307 Lebanese villages and towns, only 292 had irrigation networks sufficient to meet the agricultural requirements and that were in relatively good condition. The number of irrigation networks requiring rehabilitation was 354; 661 villages had no irrigation networks. The study suggested that about 1,461 kilometers of irrigation networks need to be rehabilitated and about 2,944 kilometers need to be newly installed.

The study also reported that about 4,239 kilometers of agricultural roads need to be rehabilitated, while an additional 4,522 kilometers have to be built in order for Lebanon to meet the requirements of a developing agricultural sector; in fact, these roads are necessary for the development of the economy as a whole.

B. Institutional Setup and Research Facilities

The Ministry of Agriculture is the primary ministry involved in the agricultural sector, although other ministries are involved indirectly. For example, the Ministry of Hydraulic Resources oversees the construction and maintenance of major irrigation networks, and the Ministry of Housing and Cooperatives is involved in machinery cooperatives and an ongoing rural credit program.

Table 2.8 shows the Ministry of Agriculture's percentage share of the total budget for the years 1980 and 1991; the figures show a continuous decline in the Ministry's share since 1984. The Ministry's small share of the total government budget precludes its efficient and active involvement in the development of agricultural policies.

While a number of Lebanese agricultural research facilities have sustained serious damage during the hostilities, several continue to function. Operational facilities include that in Fanar, on the outskirts of Beirut, and the Agricultural Research Institute, both of which conduct research related to the mechanization of crop production. Another, the Animal Production Office, explores methods of reducing the overall dependence of the country on imported feed by studying the possibilities of increasing forage crops under rainfed and irrigated conditions.

An important private research facility exists at the Faculty of Agriculture and Food Sciences at the American University of Beirut. The Faculty runs a large experimental farm in the Bekaa Valley, at which many kinds of research pertaining to the agricultural sector are carried out, and where students are trained to apply what they have learned in the classrooms. The farm is fully mechanized both for rainfed and irrigated crops.

III – Sample survey

There is a serious and considerable lack of reliable and accurate data on the agricultural sector in Lebanon. This fact prompted the authors to conduct a sample survey aimed at obtaining acceptable estimates of important variables such as productivity measures (yields) for the important crops, investment flows in the agricultural sector, farm gate prices for the year studied (1988), value added ratios, and contributions to the gross domestic product by each major crop and livestock group.

A total of 125 questionnaires were completed; the 21 major crops surveyed comprised about 90 to 95% of the total agricultural crop production in 1988. In addition, eight different types of livestock and livestock products were studied. The questionnaires were distributed in each governorate (*mouhafazat*), excluding the capital, 11 districts (*cazas*) within each *mouhafazat*, and 62 villages.

The questionnaire was designed in tabular form, allowing calculation of the gross output by determining the yield per hectare for crops, intermediate consumption, investment ratios and average farm gate prices. Two forms of the questionnaire were used; one for crops and the other for livestock and livestock products. The English language version of the questionnaire for crop production is presented below

(Figure 3.1, page 93*;* the actual survey was carried out in Arabic). The results of the questionnaire are shown in *Tables 3.1* and *3.2.* The crop tables show the areas planted with each crop, the average farm gate price, the yield per hectare, value added ratios per crop, and retail prices per crop.

In terms of profitability to the farmer, the crops surveyed may be divided into three different groups. The first group, the most profitable, is composed of greenhouse cucumbers and tomatoes, carnations, roses, opium, oranges, bananas, and mandarins. The second group includes apples, grapes, olives, lemons, muskmelons, potatoes, lettuce, and hashish. The least profitable group includes watermelon, tomatoes, onion bulbs and grains, and wheat.

The relative contribution to gross domestic product was registered as follows (crop type with the highest relative contribution listed first): 1) protected-field crops; 2) industrial crops, namely olives; 3) open-field crops (fruit trees and prohibited crops such as opium and hashish); and 4) open-field vegetable crops. The average value added ratio to gross output for crop production in the country averaged about 65% and the estimated investment for 1988 was a little less than 1% of the total agricultural production.

Table 3.2 shows that the highest value added ratio was registered in marine products; however, in terms of the total value added, dairy products contributed most to gross domestic product, followed by goats and broilers.

IV – A Modelling Attempt of the Agricultural Sector

The authors' initial objective was to construct a computerized general equilibrium model which would function as a multi-sector, multi-agent construct. These elaborate models are essentially research tools which take a considerable amount of time to construct. They cannot be done within an operational time frame in developed countries, let alone a country which has no data whatsoever. In addition, the complexity of these models makes it almost impossible to get intuitive results, or to carry out sensitivity analysis by changing the model parameters.

The second best alternative was to construct a sectoral model for agriculture in Lebanon. Such models are usually constructed for the purpose of illuminating the choices surrounding a given policy and project design. From the view point of a policy-maker, a model's value must be dominated by its ability to predict the reactions of the economic sector to changes in exogenous or policy parameters. For example, a policy maker is interested in the effect of policies which may include setting a price support system for some crops, and/or assessing the impact of new technology, changes in the water supply, fluctuations in the exchange rate, the effect of a tariff imposed on agricultural inputs, the effect of a credit package, etc.

1. Conceptual Issues

The modelling of agriculture is different from the modelling of other sectors in many respects. First, in agriculture there is a myriad of decision-makers. Crop selection and production amount constitute decisions made by thousands of farmers; no connection exists between the policy maker and the actual decision makers. Second, there is no link between instruments and objectives in most models. If, for example, the government has an objective of full employment or maximum output, the farmer may not go along with the policy maker's objective, but rather pursue the objective of maximizing his own profit. Third, agriculture is characterized by the existence of too many activities. Crops produced under different conditions or by different farmers are not homogenous. This is especially true in Lebanon, considering its small farm areas and various climatic conditions. Because agricultural activities are tied to location-specific factors such as climate, soil type, rainfall, and tradition, aggregation becomes necessary (a process with many potential problems in measurement, representation, and aggregation itself). In any case, every sectoral model should contain the following elements (Hazell & Norton, 1986):

- **A description of producers' economic behavior**, i.e, their decisions on output composition and scale. The motives of profit maximization and risk aversion figure importantly in these decisions. For example, according to the survey conducted, profitable crops may not necessarily be the most productive ones. Thus, in terms of policy making, the government (policy-maker) should use indirect instru-

ments to induce farmers to make appropriate resource allocation decisions if output is to be maximized. In Lebanon, there is a major problem involving prohibited products (hashish and opium); in order to induce farmers to shift to other crops, some incentives should be given to them to change the allocation of land to different crops. For example, a land preparation bottleneck for other crops may be eased by increasing credit, the supply of tractors, or other inputs.

- **A description of the production functions available to producers in each region**. These functions relate yield to inputs and they are different from one region to the next. For example, a farmer in rainfed areas may not be able to grow all the crops that a farmer in irrigated areas can, and may not have access to the same degree of mechanization.

- **A definition of the resource endowments held by each group of producers**. These endowments refer chiefly to land, irrigation supplies, machinery and labor.

- **A specification of the market environment in which the producer operates**. This will include market structure, demand functions, supply of inputs and their elasticities, the availability of credit and the marketing of agricultural products. Moreover, the market environment also includes international trade and the corresponding input and export functions.

- **A specification of the policy environment of the sector**. This is very important for policy setting and evaluation. For example, values are needed for input and output subsidies if they exist. In Lebanon, these subsidies have not been used except in a few cases, such as wheat output subsidy prices which have been reinstated recently. Other policy instruments such as quotas and tariffs are not relevant in Lebanon at this time.

One very important factor in agricultural production revealed in the survey is the element of risk. There seems to be a great amount of diversity in the Lebanese agricultural sector, with the existence of factor markets and the absence of market distortions (no subsidies, no intervention). This diversification is due in part to climatic conditions (which are not addressed here) and the existence of risk; considerable evidence suggests that farmers are aware of risks and act to avoid them. The incorporation of risk into a sectoral model of the Lebanese agricultural sector will lead to considerable complexity in the choice and interpretation of the model's objective function.

The risks in the Lebanese agricultural sector arise mainly from price variations, marketing and yields. Price variations have been very important, particularly during the war period. Fluctuations are largely the result of changes in the exchange rate that have become acute since 1984. Output and input prices, especially those for imported goods, have been subject to great variations; farmers find themselves unable to formulate any forecasts about future prices. This is critical in the absence of any price support system or subsidy on imports; price fluctuations are not smoothed out by any type of government intervention. The marketing of output has also been frequently subject to the security and political conditions. The closure of domestic roads and borders has prevented the export of agricultural products and considerably increased the amount of risk faced by farmers. Finally, the fact that some domestic and export markets are dominated by monopolies creates risk-related market distortions even though the government is not heavily involved in the market.

At present, as argued by Hazell & Norton (1986), the only practical method developed to incorporate risk into the objective function of agricultural sectoral models was devised by Hazell & Scandizzo (1974, 1977). Several key assumptions are required, the most important of which are that 1) the initial source of risk lies in yields, and it is the resultant fluctuations in output that cause variability in prices, and 2) farmers operate in a competitive environment. These two assumptions are not met in the Lebanese case because the source of risk does not lie in yield but in prices which are influenced by sources other than output. In addition, the market is not a competitive one.

2. Data Issues

While agricultural sectoral models are based largely on cross-section data, time series data are also needed. In many cases, particularly in Lebanon, this is one of the most difficult data requirements to fulfill. A

listing of the standard kinds of data needed for a typical model would include the following items (Hazell & Norton, 1986):

- Input/output coefficients for production by product, technology and region
- Resource endowments
- Quantity produced and marketed
- Quantities and prices for imports and exports
- Input prices
- Demand elasticities
- A time series on price and quantity by product and region
- The risk aversion parameters

In many countries, most of the above data are published or available in existing studies. In Lebanon neither is the case; all the data have to be collected, managed and processed by the researcher himself.

Given the conceptual and practical difficulties, building a model is not presently feasible. It is evident in the literature that, although some models have been beneficial and have produced some useful insights, a great number of models have been dismal failures. Substantial human effort and computer resources have been lost without producing useful insight. Models are consumers of data, not suppliers. Data needs are usually not recognized at the beginning of the process and are underestimated most of the time; the full extent of the need is not evident until the modeler is well into the exercise.

Thus, one should be firmly convinced that the modelling exercise will be beneficial before beginning. An instinct for deciding when a model is appropriate can best be developed through experience. The authors have come to the conclusion that the construction of a sectoral agricultural model, in addition to being beyond the time and financial resources of this study, simply will not benefit the sector in any substantive way.

V – Action Items

This section identifies specific action items that can be undertaken to enhance the role of agriculture in the overall development pattern of Lebanon. The authors feel that these recommendations respond to the many problems that the Lebanese agricultural sector is facing at the present time.

- The survey clearly indicated that protected crops, i.e., those planted in greenhouses, were among the most profitable while belonging to the group with the highest value added ratios. The widespread use of greenhouses is, therefore, desirable and required from a commercial, as well as from a macro-economic, point of view. Use of greenhouses could also lead to a sizable reduction in imports of agricultural products; this would decrease the reliance on food imports and cut down on the amount of foreign currencies that are necessary to finance these imports. It should be noted that these imports amounted to about one billion dollars in 1986 and that a reduction in this amount would alleviate the pressures on the exchange rate of the Lebanese pound and consequently on prices. It is, therefore, worthwhile for the government to encourage and assist the use of greenhouses.

- Olives and grapes constitute the main inputs in the production of oil and wines, and make possible the corresponding revenues the sale of these items generate. For that reason, policies should be adopted providing incentives for increasing the area planted with grapes and olives and to improve the average yield per hectare of both crops. Policies should include credit assistance and long-term loans to both farmers and industry. Credit assistance programs should enable small farmers to mechanize their production processes and assist the establishment of cooperatives for marketing and production.

- Programs to eradicate the planting of prohibited crops should be implemented. If the effort is to succeed, it must be accompanied by the provision of funds to induce farmers to cultivate alternative crops such as grapes, sunflowers, and animal fodder. Because replacing each hectare with an alternative crop currently costs about $10,000, the Lebanese government should seek the help of other governments and international agencies in financing such a campaign.

- It is imperative for the government to engage in the establishment of food storage facilities. These facilities are essential if food security is to be improved. Furthermore, these storage facilities would ensure the quality of the food items consumed by the Lebanese public and allow the storage of citrus and other fruits, the predominant exports, pending their export.

- There should be an effort to encourage the introduction and widespread use of new agricultural technologies which, while requiring the vocational training of agricultural workers, would soon realize cost savings. Examples include the use of sprinklers and drip systems in irrigation; these would require approximately $2,500 per hectare, yet would reduce water costs by 40-50%.

- Inspections of slaughterhouses should be established in major cities. Villages and towns, in turn, can be supplied with beef and other meats from these slaughterhouses. At present, because inspections are virtually nonexistent, the level of supervision and the quality of the meat is not ensured.

- There is an obvious need to rehabilitate those agricultural research facilities damaged during the hostilities. These include the Tel Amara and the Abdeh stations as well as the Ministry of Agriculture laboratories.

- There is no doubt that the main problem facing policy-makers is that of inducing farmers to stay on the land and invest it its cultivation. To that end, the risk associated with revenues has to be dealt with effectively. A distinction can be made here between two types of agricultural products. The first is those products necessary for food security, such as wheat. If left to market forces, there is a real possibility that the production of wheat will disappear altogether. Such products should be supported by the government, as a price support system would ensure food security and revenue stabilization. This should be accompanied by appropriate measures designed to ensure a minimum level of productivity and competitiveness. The second group, products which are not necessary for food security, should be left to market forces.

- A closely related issue is marketing agricultural output. Certain organisms within the ministries of agriculture and the economy should be activated. For example, the Lebanese Fruit Office should pursue the development of external markets for fruit exports and the Office of Animal Production should encourage and promote animal production, particularly of meat and milk products, and pursue the domestic marketing of these products.

- The issues of revenue stabilization and marketing can be addressed more appropriately by the establishment of agricultural cooperatives. Cooperatives can stabilize prices, help farmers adopt the latest technology, provide pesticides and fertilizers at affordable prices, and create or improve commercial networks to reduce the cost paid to wholesale dealers.

- Of utmost importance to the development of the agricultural sector is the availability of credit. The lack of credit to agriculture is very severe and, as mentioned earlier, its share in total bank credit does not correspond to the contribution of this sector to total domestic output. The existing loans are largely short-term loans extended by commercial banks to large farmers. Small farmers do not have any access to financial institutions, while large farmers cannot borrow on a medium- or long-term basis. It is understandable that banks do not engage in extending medium- and long-term loans to any economic sector which is considered high risk. For that reason, the Bank for Agricultural Credit was established a few years ago; however, it has never been functional. It is absolutely necessary for the government to activate this bank and extend credit at relatively low rates of interest so that investment in agriculture is encouraged. This should be done within the overall context of an agricultural policy, so that the requirements imposed on any financing operation will be synchronized with the objectives set by the policy maker. These requirements can be used as indirect instruments to induce farmers to produce crops which reflect the overall intent of agricultural policy.

- Finally, as mentioned earlier, the lack of reliable data in general and agricultural data in particular calls for the creation of a bureau that collects, disseminates and publishes statistics which are of use to policy-makers and researchers alike. In 1980, the FAO suggested the transformation of the Bureau of Rural Economics at the Ministry of Agriculture into a department of statistics and agricultural studies.

This could be a good alternative in the absence of a national statistical office or agency that generates statistical information for all sectors.

VI – Conclusion

This paper has discussed the main physical, human and macro-economic characteristics of Lebanon, and explored the trends observed through the main economic indicators of the past few years. Also provided was a detailed description of the decomposition of the agricultural sector which included land distribution, technology use, infrastructure, productivity, farm gate and retail prices, and value added ratios for different crops in 1988.

It is clear that the major deficiency in Lebanon is the extremely limited role that the public sector plays in the development of the agricultural sector and in the enhancement of the sector's role in the national economy. Policy instruments are lacking or virtually nonexistent; the fact that the share of agriculture in the Gross Domestic Product remained the same in 1988 as in the pre-war period is largely due to the production of prohibited crops and not to the implementation of effective agricultural policy. It is evident that the agricultural share of the GDP declined in 1989 and 1990 partly due to the registered decreases in the production of illegal crops.

From all that has preceded, it seems that a restructuring and rehabilitation of the Ministry of Agriculture is required in order to render it an efficient and effective policy making body that will be engaged in the development of the agricultural sector. The Ministry of Agriculture can play that role if provided with adequate facilities and qualified personnel. It will also require technical assistance and equipment to assist in its planning and operational functions. In addition, efficient functioning of the National Bank of Agricultural Development is an urgent necessity with regard to agricultural credit. This should be accompanied by land reclamation projects, the rehabilitation and construction of agricultural roads, reservoir construction, and the purchase of agricultural machines. When implemented, these measures will provide the foundation for the continued development of this vital sector of the economy into the coming century.

Notes

1. This section draws heavily on Chami (forthcoming) and El-Khalil Youssef (1991).
2. Official statistics, particularly national income accounts, were discontinued in 1973. Data about GDP are estimates derived from the Chamber of Commerce and Industry, and El-Khalil Youssef (1990). The sources of all monetary data are the Bank of Lebanon and the International Monetary Fund.
3. The GDP debt ratio was estimated at more than 90% in 1989. It reached a level of 112% in 1984, and no more than 30% in 1982 because of the large depreciation and high inflation rate during this period. Indeed, one way of reducing the real value of the public debt is to create inflation, as is practiced in many developing countries.
4. Many people have argued that the Israeli invasion of Lebanon in 1982 and the subsequent deportation of Palestinians from Beirut has precipitated the polarization of the opposing Lebanese factions, the weakening of the government, and the consequent drastic depreciation of the Lebanese pound.
5. UNDP, GDP estimates for Lebanon, 1988, 1989 and 1990.
6. Dornbush and Simonsen (1989).

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~ Appendix ~

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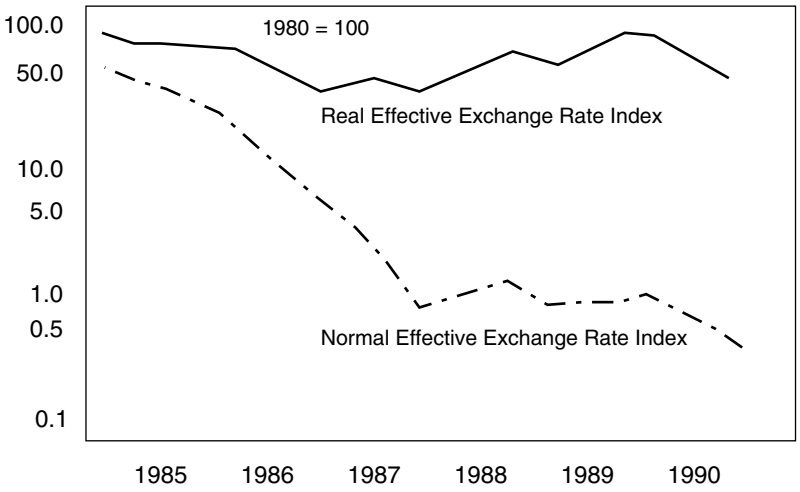
Exchange Rate Movements, 1985-1990



Inflation and Depreciation of the Lebanese Pound, 1985-1990
(percentage Change)