COMBINING QUANTITATIVE AND QUALITATIVE APPROACHES TO RURAL DEVELOPMENT ANALYSIS: THE CASE OF AGRICULTURAL INTENSIFICATION IN LEBANON

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Abstract

While peripheral rural regions in Lebanon face typical problems of lagging development and economic marginalisation, they have not been regarded as a priority for policy-makers, and significant disparities between these and other regions have emerged as a result. Local extensionists have encouraged technological innovation as a means to improving farmers' livelihoods, and this has led to increasing input use and an intensification of agricultural production. This paper applies contrasting quantitative and qualitative methodologies to analyse the effects of such changes at the level of the overall economy of Lebanon and also to explore the impacts on rural households. A Computable General Equilibrium (CGE) model explores several simulation scenarios in which agricultural output increases due to intensification in the use of intermediate inputs. The results are evaluated at local level through the use of qualitative case-study analysis carried out in the Hermel region of northeast Lebanon. Quantitative simulations indicate that, while intensification has a positive effect overall on the Lebanese economy, the effects on rural households and the income of farmers are negative; the case-study demonstrates that, at local level, agricultural trade liberalisation, increased agricultural output and greater volatility of commodity prices has resulted in farmers opting for lower input use and more secure market forms of production.

Introduction

A consistent and coherent approach to analysis of rural development is hampered by the continuing lack of a comprehensive definition (even a decade after this observation was first made: Van Der Ploeg *et al*., 2000), let alone a shared basis of conceptual understanding. However, a broad consensual description might suggest that this is a locally identifiable process, to some extent self-sustaining, which addresses well-being in economic, social, cultural and environmental respects, on an inclusive basis (see, for example, Shepherd, 1998; Thomson, 2001; Moseley, 2003; Freshwater, 2007). Consequently, mainstream economic analyses alone may not provide sufficient insights, despite their ability to focus on some crucial determining dimensions such as income distribution and employment levels. Other styles of analysis, which may range from the wholly qualitative through to exclusively quantitative, will have similar drawbacks, so a combination of insights from different disciplinary perspectives may better address "the salient challenges that cut across disciplinary boundaries" (Lowe and Phillipson, 2006: 166) in determining how rural development

objectives are being fulfilled. Mixed methods analysis offers the advantage of not only being able to corroborate and validate results derived from different approaches, but also to deepen and extend understanding (Johnson *et al.*, 2007).

This paper aims to engage with the challenge of combining quantitative and qualitative approaches to rural development analysis through a focus on the effects of agricultural intensification in Lebanon. The Lebanese experience of economic development, although hampered by conflict, has emphasised trading and the supply of financial services in a predominantly open economy setting. Industrialisation has been constrained, and the consequent labour force structure exhibits significant disparities between coastal Beirut, the Mount Lebanon region, and the marginalised and impoverished rural interior.

The quantitative approach described in this paper employs a CGE model of Lebanon of the type developed by the International Food Policy Research Institute (IFPRI) (Lofgren *et al.*, 2002), with spatial disaggregation of households in order to demonstrate the impact of an agricultural intensification shock under various different assumptions. The qualitative approach employs a variety of data gathering techniques, including secondary documentation and semi-structured depth interviews, to provide a localised case-study perspective on the same experience. Comparison between these contrasting paradigms of inquiry does indeed provide validation and greater depth of insight but, more than that, it provides substantial additional material for reflection on the practice of rural development analysis.
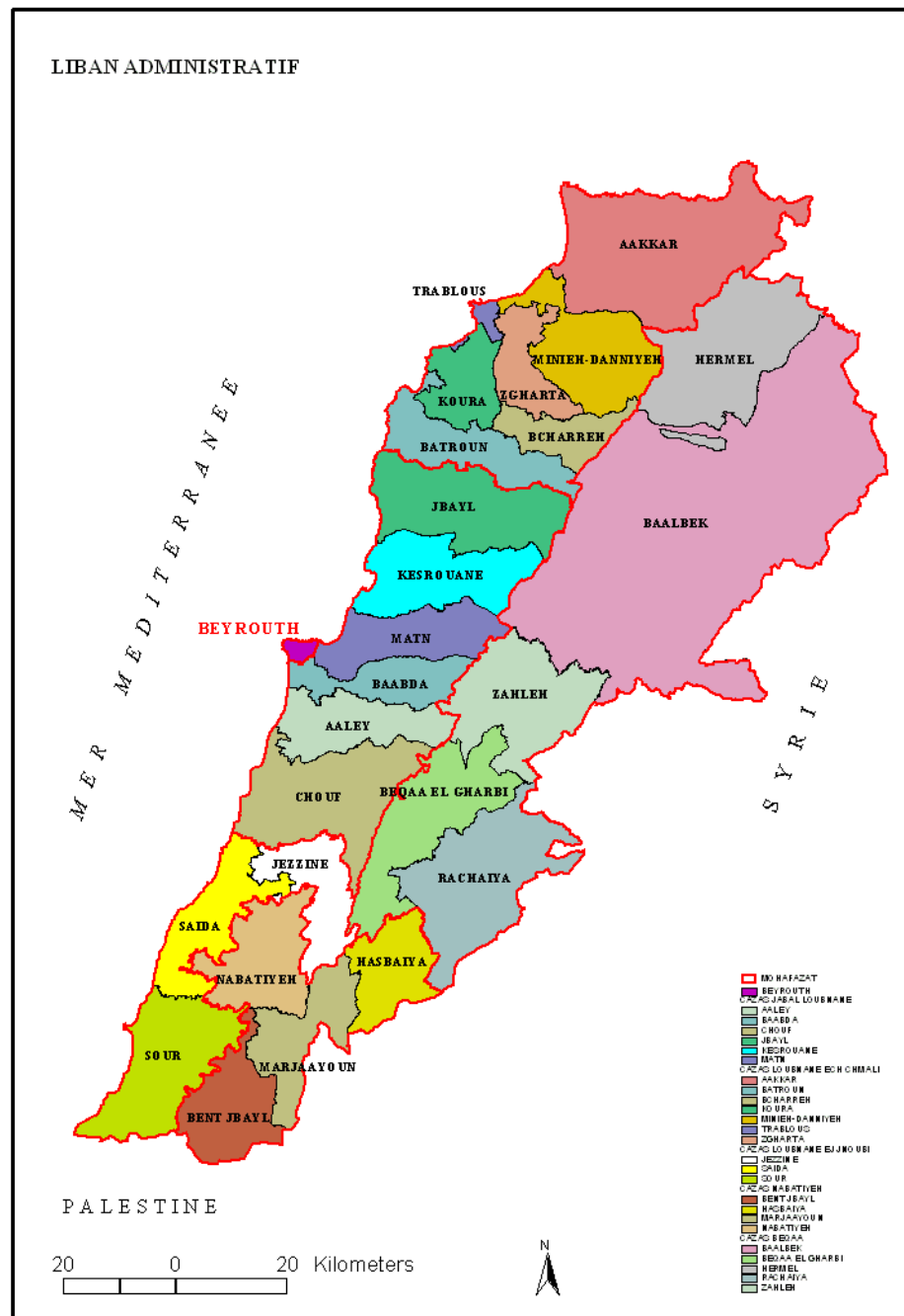
One major problem for mixed methods research is that, in a paper of conventional length, it is not possible to devote the kind of extensive and thorough description that would be normal for the application of each method on its own. Thus the descriptions of the quantitative and qualitative analyses which follow are necessarily brief, to allow scope for the main focus of the paper to develop insights based on the interplay of the results and the rationale on which they are respectively based. The paper is organised in five major sections following this introduction. First, context is provided in the form of a sketch of relevant political and economic factors in the history of Lebanon. Second, the basis of CGE-based analysis of the role of agriculture in growth and income distribution is outlined, followed by description of the sources and methods used to construct the underlying Social Accounting Matrix (SAM). Third, the effects of a range of different simulations on macroeconomic data, (output, absorption, value-added, consumption, investment and trade balance), labour structure (labour demand, factor income), household income and consumption are summarised. Fourth, case-study results are drawn from a range of perspectives, particularly the discourses of farmers themselves which explain their production strategies on the basis both of experiences and of rationales which underlie their choices. Fifth, and finally, results from the two approaches are contrasted and interpreted, and the paper concludes with a commentary on insights which can be obtained by combining methodological perspectives.

The overall Lebanese economic and policy context

Two important characteristics emerge from the study of the historical development of Lebanon in terms of territorial development. The first element is related to the different intensities of capital penetration, and the economic and political disparities this has induced between the core and the

periphery[1] of what later became the Lebanese State (see map in Figure 1). The second feature is the reproduction and deepening of these disparities over time, independently of political changes.

Figure 1: Administrative Districts of Lebanon[#]

19th Century European investment in the silk industry resulted in the integration of the Mount Lebanon region (the mountainous range which bisects the modern state) into the international trading system, and consequent development of Beirut as an intermediary trade port. The merchant traders of Beirut invested in agriculture for export, and rural areas were transformed due to the specialisation in silk and the consequential decline of subsistence production (Labaki, 1984). Economic change eventually provoked the demise of feudalism, and with increasing trade and improved infrastructure the rural hinterland became absorbed into international markets by producing wheat as an export commodity. The interruption of the First World War and ensuing French Mandate from 1920 held back the development of the Lebanese rural economy, and preserved the political and power structure in the hinterland, further widening the economic gap already present (Firro, 2003). French administration confirmed the hegemony of Beirut and Mount Lebanon, acceding power to a small class of merchants, bankers and landlords; and "strengthened a pattern of economic activity in which agriculture and industry had become more and more subordinate to banking and trade" (Owen 1976: 24).

After independence in 1943, this élite's interests were expressed in an economic strategy based on trade and financial services. The country was envisioned as the link between West and East, an *entrepôt* for commodity transit and a safe haven for capital. The intentionally minimalist role for the state was to secure a free market economy in which goods, currency and capital were free to move; economic agents would evolve and benefit from the state *laissez-faire*. Growth in trade was accompanied by Beirut's emerging role as a financial hub mobilising capital inflows from the Arabian Gulf oil economies (Gates, 1998). Correspondingly, agriculture and rural development were almost completely neglected, several opportunities to undertake an industrialisation process were sacrificed, and the result of this *laissez-faire à la libanaise* being central to state ideology produced growing income inequality and uneven territorial development, creating economic bases for social unrest (Gaspar, 2004).

Reforms during the Chehab presidency in the late 1950s aimed to strengthen state institutions and, while leaving the basis of the economic system largely intact, introduced some forms of socio-economic development. Agriculture and rural development were tackled for the first time in 1959, including a series of irrigation and rural development projects, the most important being the creation of a dam on the Litani River. While this had important effects on the lagging rural areas of Lebanon, government spending remained limited. The 1960s share of agricultural spending in the national budget averaged around 2.5%, even though the sector represented half of the workforce and was responsible for 11.6% of the GDP in 1964-66.[2] This neglect is striking when considering that Lebanese government had a constant surplus budget from 1943, used to accumulated assets and maintain the strength of the currency. Public finances have, however, been in deficit since 1992, after the ending of the civil war, but pegging the value of the Lebanese Pound (LBP) to the United States dollar (USD) has been one of the untouchable priorities of the government. Over these post-war years the average share of agriculture in the national budget was around 0.4%,[3] while in 2005 the sector employed 7.5% of the workforce and its share of GDP had fallen to 5.2%.[4]

Contemporary agricultural policy predominantly implements sporadic cooperation projects with external donors, and oscillates between the agenda of international organisations and the political will of the Lebanese government. Post-war policies associated with the premiership of Rafic Hariri

continued primary emphasis on the protection of the currency, accompanied by tariff reduction and heavy reliance on debt to finance reconstruction projects, mainly in Beirut. These have exacerbated existing regional disparities and further marginalised certain regions, and while even Mount Lebanon suffered to an extent, regions such as Akkar and Baalback-Hermel did not witness any significant public investment. Poor rural households experienced a 4% annual decrease in their purchasing power between 1992 and 1999 (Debié and Pieter, 2003).

Furthermore, the legacy of the civil war divided the Lebanese territory into regional cultural and political blocks under the control of the different religious communities and their associated parties and militias, producing a mosaic of small territories and social spaces, in each of which the power of the state and the influences of the local political élite is relative. According to Debié and Pieter (2003: 225), the contemporary Lebanese state has to accept the coexistence of several political spaces characterised by the superposition of multiple systems of power, decision-making and legitimacy. One such political space, dominated by the Hezbollah movement, is Hermel, a Shia Muslim town and surrounding area adjoining the Syrian border at the northern end of the Beqaa Valley. This is the site for the case-study component of this study.

CGE-based analysis of rural development

CGE models have become a very popular means of analysing agricultural issues from the perspective of trade liberalisation, poverty alleviation and food security. The appeal of the approach, according to Devarajan and Robinson (2002), lies in its capacity to analyse policy impact and, through the models' structural basis, to identify winners and losers from simulated policy changes, and thence to anticipate possible compensation schemes that might generate ex-post Pareto improvements. Thus, for example, Minot *et al*. (2010) used CGE models and case studies to focus on trade liberalisation and poverty in the Middle East and North Africa region, including case studies of Egypt, Tunisia, Syria and Morocco, all countries that are characterised by high levels of agricultural subsidy and tariff protection. The general conclusion of the study was that removal of trade barriers and agricultural subsidies would have positive overall impact on macroeconomic balances, to the extent that government savings would be more than adequate to fund remedial measures, although in the specific case of Morocco a partial liberalisation would not sufficiently raise national income to offset the decrease of unskilled agricultural labour income. Other recent studies which concluded that trade liberalisation positive impact of on poverty alleviation, poor households' income and food consumption, reflecting the pro-trade liberalisation discourse of international economic institutions, included direct applications of a static CGE model (Samuel *et al*., 2008; Paul *et al*., 2009); models linked to global trade simulations (Cororaton, 2006; Ardnt and Thurlow, 2009; Warr, 2010); and dynamic implementations (Thurlow, 2004; Breisinger *et al*., 2007).

Two recent CGE-based studies in Lebanon (Dessus and Ghaleb, 2006; Lucke *et al*., 2007) primarily focused on issues of public fiscal reforms, debt service and trade to support the Lebanese application for WTO membership. While these provide a valuable context, for current purposes a CGE model based on the IFPRI framework (Lofgren *et al*., 2002) has been developed to explore, in detail, recent policy shocks that have affected agriculture. The variables and most parameters of the CGE are based on a benchmark SAM for Lebanon in 2005, adapted to disaggregate agricultural commodities and the agro-industrial sector in detail. The macro-SAM is shown in the Appendix;

apart from some minor updating, this is consistent with Lebanese National Economic Accounts (PCM, 2007).

The benchmark Lebanese SAM describes nine activities, including agriculture and agro-industry. Agriculture produces seven commodities, ten commodities are produced by the agro-industrial sector, the remaining seven sectors produce a single composite commodity, and there are three accounts for trade margins. Value-added is divided into returns to the Government on public capital investments, company and farm profits (considered separately), and mixed incomes received by self-employed workers. Labour incomes are described by activity and type of worker, distinguishing between high skilled, white-collar, blue-collar and military labour. Value-added is distributed across the regions of Lebanon. Household income is the sum of the household share of each type of factor income, transfers from the government (to employees and as interest payment of government securities), and remittances from the rest of the world (which are important as the Lebanese economy consumes more than it produces). Government transfers to employees (other than wages) were directly extracted from national accounts and distributed in proportion to the number of government employees in each household group. Household consumption and income data were obtained from the unpublished Lebanese Government Household Living Condition Survey, also conducted in 2005. The household account was disaggregated into 150 household types, firstly by identifying deciles based on per-capita consumption, and secondly each decile was distributed across fifteen geographical strata by location in Lebanon. A full description of the SAM accounts appears in Table 1, below.

Table 1: Description of SAM Accounts

Macro SAM accounts	Micro SAM accounts
Activities	*9 accounts*
	Agriculture (AGR), agro-industry (AGIND), industry (IND), construction (CONS), energy and water (ENW), Transport and telecommunication (TTCOM), services (SER), trade (TRADE), public administration (ADMIN)
Commodities	*24 accounts + 3 accounts for trade margins*
	Agricultural commodities (7): cereals (CRL), fruits (FRT), industrial crops (INDCRP), vegetables (VEGT), livestock (LIVES), livestock products (LIVESPR), and fish (FISH). Agro-industrial commodities (10): fresh meat (FRMT), food preserves (FPR), dairy products (DAIRY), fat and oil (FATOL), pasta (PASTA), sugar-chocolate- sweets (SGCHS), alcoholic beverages (ALBVRG), non-alcoholic beverages (NALBVRG), other food products (OTHER) and tobacco (TABAC). Each of the other 7 sectors produces one commodity respectively: CIND, CCONS, CENW, CTTCOM, CSER, CTRADE and CADMIN. Trade margins are divided into three accounts: domestic (TRNCSTDOM), import (TRNCSTIMP) and export (TRNCSTEXP)
Factors	*8 accounts*
	Capital (1): (CAP), mixed income (2): Farm unit: (FARM) and self-employment (SELF). Labour (5): high skilled labour (HGSK), white collar (WHCL), blue collar (BLCL), armed forces (ARMED) and foreign labour (FGNLAB)
Households	*150 accounts*
	Households are divided across 10 equal consumption deciles, which are in turn divided across 15 geographical strata.
Government	*4 accounts*
	The government account (GOV) and three tax accounts: direct taxes on households (YTAX), taxes on activities (ATAX) and tariffs (TAR)
Capital	*2 accounts*
	Investments and savings (S-I) and changes in stocks (DSTK)
RoW	*1 account*
	Rest of the world (RoW)

Based on this SAM, the CGE model consists of a system of 48 simultaneous non-linear equation blocks defined over 4 main sets (activities, factors of production, commodities, and institutions), which are in turn divided into 13 subsets.

Producers are assumed to maximise profits subject to a two stage production function. The lower tier models value-added with a Constant Elasticity of Substitution (CES) function, using primary factors of production to the point where the marginal revenue product of each factor is equal to its wage. A Leontief function relates demand for intermediate inputs to total composite commodities (import and domestic). The upper tier links final output to intermediate input and value-added, also using a CES function.

All commodities enter markets. The first stage in modelling commodity flows is to generate aggregated domestic output; this stage also models the share of output of different commodities coming from one single activity (which is required for agriculture and agro-industry). Then, aggregated domestic output is allocated between export and domestic sales, assuming that suppliers maximise sales revenues for any given aggregate output level. This stage is determined by a constant elasticity of transformation (CET) function. Domestic sales and imports constitute the composite commodity, and demand for domestic output versus imports is governed by an Armington function that recognises imperfect substitutability.

Institutions are represented by households (150 household groups), government (tax accounts are separated from the main government accounts), and the Rest of the World. Households receive income payments from labour factors of production, transfers from the government, and foreign remittances. They use their income to pay direct taxes (activities accounts pay indirect taxes, and commodities accounts pay taxes on imports), save and consume. Household consumption is allocated across commodities according to a Linear Expenditure System derived from maximisation of a Stone-Geary utility function. The Government collects taxes and receives transfers from activities (publicly owned companies in the telecommunication and the energy sectors). It transfers its income to other institutions; Government savings are a flexible residual (a deficit in the case of Lebanon).

The model includes three macroeconomic balances: the (current) government balance, the external balance (the current account of the balance of payments, which includes the trade balance), and the savings-investment balance. Equilibrium can be achieved using one of three different closure assumptions: in this analysis, government savings are flexible and direct tax rates are fixed, the exchange rate is fixed and foreign savings flexible, capital formation is flexible, and there is a fixed marginal propensity to save for all non-governmental institutions. As for factors of production, capital is fixed and sector-specific, farm mixed income is fixed, and other factors are mobile across sectors in a context of unemployed labour.

Simulations: production technology, trade and distribution shocks

The aim of this section is to summarise changes predicted by the CGE model induced by both the technological changes in agriculture production and the variation in domestic and international terms of trade. Three types of technical changes in agricultural production are simulated, representing potential development paths in terms of public and extension services development, as

well as possible farmer strategies. The first, neutral technical change (NTC), leads to a 10% rise in agricultural output from an equal increase in productivity of all factors of production (based on, for example, projects leading to a rise in land productivity, such as irrigation schemes or enhanced knowledge transfer efficiency from extension services); the second, factor use intensification (FUI), shifts production technology towards more intensive use of factors of production with regards to intermediate inputs, but keeps agricultural output value constant (based on redirection and adaptation of innovation packages, more rational use of inputs, and specific support to integrated pest management and organic modes of production); the third, input use intensification (IUI), represents "mainstream" intensification and mechanisation, with a 10% increase in agricultural output (based on enhanced financial and credit institutional support to farming activities and more efficient supply chain management).

These three technological changes scenarios are then linked to potential changes in international prices and domestic trade policies. These scenarios impose direct changes onto the price and demand structure. The first addition hypothesises efforts directed towards increasing the quality of agricultural production, combined with institutional support for the re-organisation of export marketing channels to reach more diversified and profitable export markets; this simulation is based on a 10% real premium on existing export prices. The second focuses on re-orientation in domestic markets towards shorter supply chains and niche production; this simulation is based on a 30% reduction of trade margins and the consequent redistribution of value-added in favour of farmers.

Each of the foregoing is linked to a separate technology scenario. Changes in received export price, assumed to result from better organisation of export channels and increased attention to quality schemes and standards, is linked to the NTC scenario, since such changes in foreign and domestic terms of trade could help in balancing the effects of technical changes in agricultural production. These effects include a reduction in returns on land and on agricultural labour which in turn would lead to the reduction of farmers' income and favour migration towards urban centres in search for employment. Reduction of domestic trade margins simulation is linked to the FUI scenario, since both of these changes involve a reorganisation of the agriculture supply chain with a reduced involvement of intermediaries.

Table 2: Parameters of the Technical Change Scenarios

	NTC	FUI	IUI	NTCexp	FUItrm
Change in agricultural output	+10%		+10%	+10%	
Ratio of intermediate inputs to value-added for agriculture	0.25	0.2	0.4	0.25	0.2
Agricultural commodities export prices				+10%	
Domestic trade margins on agricultural commodities					-30%

The overall effects on the Lebanese economy of each scenario are shown in Table 3. The NTC, FUI and IUI scenarios all show increases in real GDP, although the smaller increase in IUI arises because of the significant increase stimulated in demand for intermediate inputs (2.69% for aggregate demand and 37.74% for agriculture). Such a dramatic increase is actually far from unrealistic because of the traditional nature of much Lebanese agricultural production, where currently intermediate input utilisation is low and mechanisation limited due to high costs. Correspondingly, a

diminution of 18.35% in intermediate AGR demand in FUI could also potentially be a realistic scenario for Lebanese farmers, resulting from more efficient input use.

Table 3: Changes in Activity Output, Added Value and Trade (% change from base)

Macro variables (%change)	Scenarios				
	NTC	FUI	IUI	NTCexp	FUItrm
Real GDP	1.53	0.39	0.72	1.44	0.93
Nominal GDP	3.02	0.50	2.00	2.61	1.13
AGR value-added (nominal)	-3.77	4.13	-12.88	-8.79	11.06
Total output	2.34	0.16	2.06	1.93	0.40
AGR output	10.00		10.00	10.00	
Total intermediate use	1.95	-0.32	2.69	1.60	0.32
AGR intermediate use	-2.01	-18.35	37.74	2.35	-12.77
Total aggregate demand	2.50	0.17	2.20	1.98	0.39
AGR aggregate demand	8.16	-0.13	8.54	6.87	0.48
Total import	1.95	-0.07	2.16	1.48	0.83
AGR total import	-6.38	-2.18	-1.93	-4.18	1.12
Total export	0.83	0.04	0.73	1.28	0.48
AGR total export	23.86	1.15	21.23	32.32	-3.68
Total employment	2.42	0.68	1.00	2.37	1.48

Among the three production technology scenarios, only FUI improves agricultural value-added. In NTC, it is reduced by 3.77%; in IUI it falls further by 12.88%, due to the significant additional reliance on intermediate inputs. However, FUI has only minor impact on other sectors, in terms of output and value added creation, whereas the increases in output generated by NTC and IUI have important effects on other sectors of the economy.

Adding the opening of export markets in a scenario of neutral technical change, NTCexp, makes the GDP increase smaller and significantly worsens farm value-added; on one hand, the increase in agricultural output decreases supply prices and largely compensates for the opening of export markets on domestic prices; on the other, the increment to farmers' incomes obtained from exports compensates for losses that would have otherwise accompanied output growth. Factor intensification with a fixed level of output and reorganisation of the domestic supply chain, FUItrm, enhances the positive (although limited) impact on the whole economy, but the effect on agriculture value-added is more significant, more than doubling the increase. Changes in price structures play a substantial part in explaining the mechanisms that assist or hold back growth in other sectors. These are shown in Table 4.

While the FUI scenario induces a relatively low decrease in demand prices of agricultural commodities, it has a direct effect on the price of agro-industrial commodities. The decrease in prices of agricultural commodities is due to a decrease in the demand for agricultural intermediate inputs. It does not induce a real change in consumption on the part of households and therefore has a limited effect on overall demand, which is shown in Table 5. This demonstrates that in the FUI case demand decreases by 0.13% for CAGR and increases overall by 0.17%. The response to the latter is an increase in domestic output by 0.16%, although imports and exports remain relatively unchanged. When a hypothetical fall in trade margins from shortening supply chains is added to FUI, very little change is introduced to the structure of relative prices – excepting, of course, CTRADE prices.

Table 4: Changes in Demand Prices (% change from base)

	NTC	FUI	IUI	NTCexp	FUItrm
CRL	-4.63	-2.35	0.07	-4.34	-1.36
FRT	-12.34	-1.45	-9.92	-8.01	-2.87
INDCRP	-2.69	-0.87	-0.92	1.08	-1.22
VEGT	-10.95	-0.64	-9.79	-9.48	-0.62
LIVES	-6.88	-0.36	-6.13	-7.43	0.51
LIVESPR	-15.84	-0.10	-15.82	-13.68	-0.34
FISH	-5.89	0.03	-5.94	-5.32	-0.10
FRMT	-1.47	-0.18	-1.11	-1.24	-0.23
FPR	-0.15	-0.01	-0.12	-0.12	-0.01
DAIRY	-0.10	-0.04	0.00	-0.07	-0.24
FATOL	-0.32	-0.06	-0.19	-0.29	-0.14
PASTA	-1.97	-0.23	-1.54	-1.59	-0.44
SGCHS	0.20	0.02	0.17	0.15	0.07
ALBVRG	-0.02	-0.07	0.13	-0.10	-0.13
NALBVRG	-0.60	-0.05	-0.50	-0.55	0.19
OTHER	-0.39	-0.04	-0.30	-0.32	-0.05
TABAC	0.08	0.02	0.04	0.10	-0.03
CIND	1.20	0.01	1.20	1.00	-0.19
CCONS	1.05	0.10	0.86	0.81	0.24
CENW	1.00	0.07	0.87	0.80	0.20
CTTCOM	2.20	0.20	1.84	1.70	0.44
CSER	1.87	0.16	1.57	1.43	0.50
CTRADE	1.94	0.04	1.89	1.73	-1.17
CADMIN	0.60	0.05	0.51	0.46	0.14

However, the significant price reduction in agricultural and agro-industrial commodities that results from the NTC and IUI scenarios augments demand and stimulates price increases in other commodities. In these scenarios, increased demand is met by an increase of both domestic outputs, (of 1.94% and 1.63% respectively) and of imports (2.34% and 2.06%). NTC combined with strengthening export prices blunts these effects, particularly on non-agricultural sectors; the increase in agricultural output decreases supply prices and largely compensates for effects of the opening of export markets on domestic prices, and the export-related increase in farmers' income compensates losses that might accompany an output growth.

Table 5: Changes in Factor Income (% change from base)

	NTC	FUI	IUI	NTCexp	FUItrm
CAP	3.62	0.28	3.11	2.84	0.47
FARM	-3.77	4.13	-12.88	0.99	11.06
SELF	3.50	0.25	3.04	2.76	0.34
HGHSK	3.38	0.33	2.76	2.57	0.97
WHTcl	3.68	0.29	3.14	2.85	0.64
BLUcl	2.37	0.59	1.13	2.26	1.33
ARMED	2.82	0.32	2.20	2.13	1.03

A prominent discernable effect, induced by these scenarios, is the weakness of the industrial sector's ability to capitalise on greater supply and lower cost of agricultural outputs, as there is little expansion outside the agro-food complex, in terms of either output or value-added. This can be explained as an effect of the redistribution of the workforce to other sectors, particularly services construction as a result of low wages in the industrial sector. The significant increase in demand for

manufactured goods is met by a similarly large increase in imports, and by a decrease in exports. The same dynamic can be observed in the agro-industry sector, although less prominently. Here, less of the increased demand is met by imports because of the decrease in the price of agricultural commodities used as intermediate inputs, which in turn translated into a decrease in the agro-industrial output price.

In the three pure technology scenarios, there is an overall increase in factor income, except for farmers, and in FUI because the scenario shock itself forces an increase in farmers' income through production technology that relies more on labour and on land productivity than on input use. Importantly, though, agriculture which demands more labour does not, in this scenario, negatively impact the other sectors. However, in NTC, farmers' income decreases by 3.77% as a result of increasing output which reduces price, whereas in IUI the larger 12.88% decrease in income comes about from a combination of reduced prices and higher input costs. In NTCexp, this negative effect on farmers' income is overcome by better export market prices. FUI unambiguously enhances farm income, but the effect is more marked when accompanied, in FUItrm, with organisation of the domestic supply chain toward more local channels and differentiation of production. These scenarios suggest that major agricultural problems Lebanon are associated with its inefficient marketing channels.

Table 6: Changes in Real Household Income by Region (% change from base)

		NTC	FUI	IUI	NTCexp	FUItrm
Areas	Beirut	1.64	0.16	1.34	1.33	0.53
	Central	1.22	0.24	0.71	1.11	0.53
	Marginal	0.70	0.53	-0.44	0.98	1.33
	Case-study	-0.16	0.90	-2.11	0.68	2.34
Deciles (all Lebanon)	D.1	0.92	0.57	-0.31	1.22	1.38
	D.2	0.91	0.47	-0.05	1.08	1.07
	D.3	0.75	0.52	-0.33	1.03	1.23
	D.4	0.76	0.40	-0.13	0.92	0.98
	D.5	0.95	0.40	0.08	1.04	0.95
	D.6	0.97	0.31	0.25	0.98	0.77
	D.7	1.14	0.30	0.50	1.11	0.70
	D.8	1.09	0.27	0.47	1.01	0.63
	D.9	1.00	0.25	0.49	0.96	0.55
	D.10	1.59	0.16	1.26	1.31	0.33
Deciles (Baalbek al Hermel)	D.1	-0.36	0.88	-2.48	0.60	2.44
	D.2	-0.80	1.33	-3.62	0.61	3.40
	D.3	-0.72	1.38	-3.63	0.70	3.54
	D.4	-0.38	1.23	-2.97	0.78	3.13
	D.5	-0.15	1.03	-2.29	0.76	2.59
	D.6	-0.37	0.87	-2.35	0.58	2.44
	D.7	0.28	0.85	-1.46	0.85	2.14
	D.8	-0.16	0.29	-0.87	0.12	0.76
	D.9	0.54	0.61	-0.75	1.00	1.56
	D.10	0.81	0.32	0.06	0.83	0.77

"Technological unemployment" involving the release of labour and farmers from agriculture should provide opportunities for other sectors to create new job opportunities. While real household incomes would rise overall in both the NTC and IUI scenarios, Table 6, providing disaggregated data,

shows that real incomes in the marginal area would fall under IUI (by a significantly greater amount in the case-study region, Baalbek al Hermel, which is very sensitive to changes in farm income). Income distribution is similarly adversely affected, with the lower deciles, D.1-D.4, showing declines at national level; in the case-study region, the decline runs further up the income distribution and is much more significant in extent.

Furthermore, the simulations show that the beneficiaries of increases agricultural output will be the richer deciles at the national level (increases of 1.59% in NTC and of 1.26% in IUI) and in the capital city region, Beirut (increases of 1.64% in NTC and of 1.34% in IUI). Improvement of technology based on a the improvement of productivity of both agricultural labour and land would be the most efficient in terms of increasing real household incomes at the national level, even though it implies a slight decrease for some deciles of the case-study region.

A consequence of the concentration of economic activities and jobs in Beirut and central Lebanon is that most new job opportunities are within the trade, transport and telecommunications, and construction sectors. The simulations suggest that the Lebanon economy could create employment in excess of jobs lost due to technological improvement in agriculture, but these new jobs are in sectors and regions away from the rural marginal areas. Although the modelling framework is not designed to show the dynamics of internal labour migration, it gives a clear indication of the pressures which lead to relocation to the capital city region in search for employment as a result of technological changes in agriculture.

Whereas IUI has a positive effect on the overall economy but negative effects on rural households and the income of farmers, the changes represented in NTC mitigate the latter substantially. However, considering the policy priorities of the Lebanese Government and the substantial costs of major irrigation schemes and extensive land remediation required to increase productivity and reduce farmer costs, such a scenario is unlikely. The favoured prescription of extension services has promoted intensification and better use of inputs to increase production – new seed varieties, drip irrigation, chemical based soil management and pest control techniques. To explore the impact of these prescriptions for farmer strategy, the focus now shifts to the case-study results.

Case-study: rural development and agricultural livelihood strategies in Hermel

Past research assessing the needs of agriculture and rural development in north Lebanon has explored its socio-economic situation and possible choices for development paths by focusing on the role perception and dynamics of actors of development (Bissat, 2002; Makhoul and Harrisson, 2002); participatory approaches (Hamadeh *et al.*, 2001; Zurayk *et al.*, 2001); and the investigation of alternative food networks (most recently Zurayk and Abu Ghyda, 2009; Atallah, 2010).

The main aim of this case-study was to gain deeper insights into the lives and motivations of farmers and local grassroots leaders in Hermel. Describing their experiences and understanding their decision-making strategies can highlight underlying processes of change in the region. This phenomenological approach tries to identify people's experiences and the social interactions that give rise to their reality. The objectives included exploration of farmers' responses to the introduction of innovations and to policy change, their relations with local extension services,

cooperatives and other relevant institutions, with local and national political institutions, and their perception of the role of the local political élite and their own agency.

Fieldwork was carried out between April and August 2010, and included documentary analysis, participant observation and semi-structured interviews. The 31 usable interviews were conducted in June and July, at the end of the watermelon and vegetable harvesting period. Most were recorded and transcribed (in Arabic[5]), although seven relied on note taking alone (see Table 7). Transcripts and other materials were coded separately under the main headings of context, livelihood resources, livelihood strategies, outcomes (together with possible changes in strategies resulting from unexpected outcomes) and the institutional process.

Table 7: List of Interviewees

		Total	Unrecorded
Farmers	Watermelon growers	4	1
	Olive growers	3	1
	Ex-cannabis growers	2	
	Current cannabis growers	1	1
	Dairy farmers	3	
	Others	2	
Cooperative and local initiative leaders	Cooperative leaders	3	
	Local initiative *Jerd*[6]	2	
	Local initiative Hermel plain	1	
Extension services	Private non-profit	2	2
	Private profit-oriented	1	
	Public	1	
Decision makers	Municipality	1	
	Ministry official	2	1
Others	Agricultural workers	1	
	Non agricultural local NGOs	2	
	Local opinion leader	1	1

In Hermel, sharecropping was predominant up to the 1950s, and continues to an extent today. It was characterised by the production of cereals and pulses in the summer, and by legumes as winter crops. Animal farming was limited to sheep and goat husbandry. This mode of production was gradually replaced by the export-oriented production of apricot fruits, encouraged by rising demand from the emerging oil economies in the Arab gulf and the organisation of export channels by traders. In 1975, with the start of the civil war, Hermel witnessed an increase in illegal drug cultivation and the region was significantly influenced by the resulting cash inflows. At the end of the civil war, increasing pressure from the state ended the cultivation of illegal drugs, although it still occurs in remote areas of the region.

Within this overall framework of production, four different type of strategies can be distinguished. *Export-oriented production* (apricots and illegal drugs), relatively low intensity production inputs, marketed through specific export or "illegal smuggling" marketing channels; *input use intensification* (watermelon production and dairying), intensive production marketed domestically and prone to price volatility; *low input production* (olives), direct marketing, in the early phase of developing a specific marketing strategy; *resource transfers*, rural development practices based on the direct sale of valorised food products by poor rural farmers to rich urban consumers. These strategies can be distinguished by production technology and marketing channel.

The introduction of drip irrigation in Hermel areas in the early 1990s eased previously existing water constraints and allowed the introduction of large-scale production of watermelon, tomatoes and other vegetables. Agricultural households saw this as an opportunity to gain good profit from this quick cash crop. *"I saw these people getting into these drip irrigated exploitations. I saw they were making profits. A dounoum[7] of watermelon would give a net return of 400-500 USD."* Farmers purchased the relatively expensive inputs using loans from input suppliers that were repaid after harvest. Availability of drip irrigation technology coincided with the end of the civil war, when the return of economic activity to "normal" – especially regarding liberty of movement between Lebanese regions – allowed input supplier companies based outside the areas to expand their business activities. Their "supply push" marketing strategy made inputs available on credit, together with free technical advice and supervision.

The problems with intensive vegetable production that emerged from the effect of significant increases in domestic output were compounded by the opening of the Lebanese market, especially to imports from Syria and Jordan. There were multilateral and bilateral trade agreements with other Arab countries, and a unilateral reduction of tariffs in 2003. The combination of these factors led to a large decrease in domestic supply prices. The outcome of the season and the farmers' ability to repay their debts became dependent on a dynamic that was out of their control. *"You sell for 500LBP a kilo at the beginning of the season and at 150LBP a kilo at the end of the season, because the Jordanian import would be in the market. The farmers who harvest at the end of the season cannot repay their debt."* Volatility of domestic agricultural prices depending on point in the production season is a familiar experience for Lebanese farmers, with a distinct price cycle when competition was limited to domestic production and to some *"smuggled vegetable pick-ups from Syria"*. Nevertheless, full competition from abroad caused prices to drop to below their (higher) costs of production, due to lack of water supply infrastructure in the region. The great majority of farmers use artesian wells. *"Electricity is supplied only 12 hours a day, sometimes 6. You can't stop from irrigating the watermelons 3 to 4 hours a day, every day just like prayers. If you don't your season is dead. You have to get the fuel for the water pump, the money, you have to".* Water pumps are powered either by electricity or by diesel, and at times both, adding to costs.

Intensive watermelon – or tomato – production remains attractive to some as, there is a hope that *"this year will be a good one"*. In some cases, farmers are the victims of a vicious circle of *"agricultural gambling"* and debt. *"Grow something else? Like what? Parsley? It does not pay back the debt. Lettuce? It does not pay back the debt. But if I get a good watermelon season, I could. You cannot pay back 40-50 million LBP[8] of debt if you do not get a good payment. Barley, wheat and whatsoever do not pay back"*. Some Hermel farmers have acquired licences to grow tobacco, the distribution of which is highly supervised by political leaders and is used as a means of political control, especially as a black market for licence reselling exists. Despite additional licence costs and low returns, it is a low risk enterprise. Consequently, some farmers grow tobacco using low input levels and traditional methods, but use the licence as collateral for the credit needed to grow intensive crops as well. This unofficial financial arrangement is common for banks and input supplier credit. Many farmers, though, have completely abandoned this form of production, or at least no longer rely on it as primary element of their farming strategy, particularly as their main concern is to secure the season's income.

Thus falling prices of input-intensive products, combined with the lowering of agricultural tariffs in 2000 and 2003, encouraged farmers to look for alternative forms of production which were less input-intensive and had greater market security. It was at this point that forms of collective rural action started to emerge. In parallel with the joint actions of the Ministry of Agriculture and international non-governmental organisations, local rural activists have promoted the re-introduction of olive oil production and new forms of rural development practices that revalorise local resources.

The re-introduction of olive and olive oil production by some extension services and donor projects has been widely adopted as an alternative for small and medium size farmers who are unable to sustain high input production. *"Farmers are looking for an output that they can control, they don't want to be controlled by their output. The olive tree gives you and does not take from you".* The ideal activity that policymakers in the region would like is something similar to apricot production, with low fertiliser, water and pest control requirements. However, securing markets remains the prominent issue and attention is given to quality and marketing strategies. From the 1960s to the 1980s, apricots were exported to the Arabian Gulf, but the channels were gradually closed off due to the ongoing civil war. Marketing became very difficult because of the short life of the fruits after ripening, *"you have 5 days to sell it. If it is not sold it falls from the trees".*

It is striking that, although apricot production flourished in the pre-civil war period, not a single processing and post harvesting industry for apricots was constructed; processing of apricots in Hermel was solely for domestic consumption. This demonstrates, on one hand, the importance of finance, and on the other, the absence of the state. Apricot farmers in Hermel did not have the capacity to accumulate the capital necessary for construction of processing plants. Furthermore, the export of apricots was controlled by powerful traders who were able to influence the policymaking process at the state level. Thus policies were directed towards mercantile trade and away from credit for entrepreneurs who wanted to establish processing plants or similar industrial activities. When export markets were lost, farmers faced considerable difficulties in marketing their output, prices collapsed, and the result was gradual abandonment of apricot production. *"We had different varieties of apricot. When one of the varieties started to ripen and fall you could not even go to the orchard to irrigate or spray the other trees because of the odour. We were forced to sell at any price; we did not want to see it fall. We found that the olive trees allowed us to sustain. You can wait to harvest, you can sell it green, and you can make oil. You control it, it doesn't control you".*

With this background, specific attention is given to the marketing, planning, capacity building, and quality focus on the production of oil. These marketing strategies aim at mitigating the relatively lower income from olive production in comparison to other crops. Many farmers explicitly prefer a secure but relatively lower income than to risk losses *"We do not have choice, many people stopped farming, this year a part of the watermelon production was not even sold. At least with olives we get USD 10,000-12,000."* Nowadays, marketing of olives and olive oil are done through traditional channels either green at wholesale markets, or through middlemen, or as olive oil in plastic containers of 20 litres. A local initiative has led to the formation of olive oil producers' cooperative that owns a modern olive oil press. In addition to olive pressing services, the cooperative is providing support to farmers on innovative production techniques. These innovations focus on

closed-cycled management of the olive orchards and use of milling residues for fertilisation (replacing conventional chemical fertiliser use), and winter intercropping with green manures.

The cooperative is also building a marketing strategy based on increased value of the product through both quality and packaging, and introducing a bottling line into its processing unit. Nevertheless, some farmers (particularly those who use the cooperative facilities for processing without being members) are perplexed by the quality policy adopted by the cooperative, as the *"quantity obtained is low"*. The cooperative's ability to sustain production on high quality olive oil depends primarily on its ability to compete in the local Lebanese market with the production from regions where olive oil production is historically well-established and better-known by consumers.

The foregoing strategies link readily with the IUI and NTCexp CGE simulations, but a more unorthodox aspect of rural development can be related to the FUItrm scenario.

In the remote village of Kwakh, to the north of the town of Hermel, an administrative development stimulated the establishment of a different kind of grass-roots initiative. Population growth in the village qualified it for local government municipality status in 1998, creating opportunities for local initiatives through participation committees, as well as providing a formal point of contact for the Beirut-based institutions which sought to be active in the region. These twin developments allowed a key local actor, though the municipality committee, to lead the foundation of a women's cooperative. This type of dynamic, innovative *animateur* features prominently in local development initiatives: for example, Stöhr (1990: 4) noted the frequent and widespread importance of a key individual outside the traditional administrative élite, with abilities "to plug into or work through local networks, which for this purpose had to be restructured or even created" in order to act as a catalyst for change.

To begin with, the initiative was based on the preparation of food products using local wild herbs. The local activist collaborated with the Faculty of Agriculture, Food and Nutrition at the American University of Beirut to enhance the value of, and sustainably manage "*more than 350*" local edible and medicinal wild herbs, as well as *mūnat*. The project idea was simple: women were trained to collect wild herbs in a manner promoting their regeneration, and to learn about the characteristics of the major plants. *"We were taught how to sterilise, pack, increase quality of what we had always cooked for our children"*. A Kwakh cooperative member, addressing Hermel municipality, noted that the framework drew on both novelty and tradition. *"Help us by hiring us for your receptions' catering needs. Instead of your usual 'petits fours' and concentrate juice, we will make you wild herb healthy snacks. It is something new and people are going back to it now."* Wild herb gathering and processing was linked later on to an eco-tourism lodge that put restored traditional houses in the village back into use.

While being founded in the local social, institutional and resource context, the initiative has managed to involve all interested women in the village. It links equally well with local, Beirut-based and international actors, utilising both bonding and bridging social capital effectively. The cooperative management was self-funded, independent of male household heads or official sources, and has subsequently grown entirely on the basis of expanded revenues. As a result it has enhanced the economic position of all of the membership. It has some of the characteristics of European alternative food networks (Marsden *et al.*, 2000), relying on direct sales promoted on products'

traditional, sustainable significance to rich urban consumers, rather like the Fair Trade approach but wholly within national boundaries. Yet it differs from European alternative supply chains in two distinct but linked ways: the concepts of local, traditional or quality are not regulated or standardised in any way; moreover, lying outside formal processes of regulation, it has avoided the problem of territorial and cultural forms of rural economic development which mask relations of dominance and further the interests of the local élites Shucksmith (2000; 2004). The Kwakh cooperative as a form of endogenous rural development practice was able to redistribute (small scale) resources and (small scale) political power toward the less powerful by changing everyday life and social habits and norms for women living in marginal rural zones. In 2004, the cooperative leader was elected to the Municipal Council – at that time, the only female member in the region.

Discussion and conclusions

It has been the intention of this paper to explore different methods focusing on the contemporary prescriptions for rural development, opposing highly aggregated and stylised CGE modelling simulations with a narrow focus on individual experiences in an unrepresentative case-study context. Both approaches capture broadly similar impacts of different agricultural technology enhancements (especially, in the case of IUI, the effects of expanded output on prices, a cost-price squeeze, and consequent declines in farmer incomes). The CGE simulations, within the limits of simplifying assumptions, indicate the likely scale of geographic, sectoral and income distribution impacts, and point to regions like Hermel as potentially interesting for in depth analysis. Both representations provide a logically consistent account and as such corroborate each other. This "triangulation" is often advanced as the major purpose of mixing different methods, although the contextualisation that the case-study results provide are perhaps more important than verification.

The case-study analysis shows how broader social, cultural, political and gender relationships interact with the whole system of market processes reflected in the CGE model. For instance, technology prescriptions that envisage large-scale infrastructure projects neglect the reality of powerful family and commercial networks that can channel limited reconstruction resources into enhancing Beirut real estate values: even if, in another more ironic instance, a fraction of the urban rich also form the clientele for traditional products promoted and marketed in novel ways. While the case study provides a perspective on simultaneous combinations of farmers' strategies in a defined location, shocks to the CGE model allow a more precise, if artificial, analysis of single strategies applied uniformly across the whole of the country. However, although on pragmatic grounds the combination of approaches provides more useful insights (and scope for meta-inference) than use of either as a sole alternative, this involves more than simply the narrowness or breadth of focus. It is also worth underlining some points of inconsistency and divergence between these two quite different approaches.

While there is no unavoidable association between these methods and the ontology, or nature of reality, which each presumes, quantitative approaches are normally linked to positivism whereas case-studies are more interpretative in style. However, "(t)he identification of positivist epistemology with quantitative methods on the one hand, and interpretativist epistemology with qualitative methods on the other, hides as much as it reveals" (Keating and della Porta, 2010: 115).

The fact that CGE model results are often what would be expected, or at least are readily explicable, is an artefact of their construction. They are constrained, via calibration, by the benchmark SAM and the initial parameter estimates – which are drawn from fundamental axioms of economic behaviour. This enables the whole national economic system to be reduced, deductively, to a consistent, extensive but manageable simultaneous equation system which captures its most significant features. In contrast, the objective of a case study is to draw out the interplay of human experiences and how the conditions which produce them are interpreted by individuals. While the purposes of what might be described as "top-down" modelling support broad policy measures which may target Pareto-efficient outcomes at an aggregate social scale, in contrast the understandings developed on a local scale, via the famous "double hermeneutic" (Giddens, 1987) can enable grass-roots understandings to be revised and used to change developmental practice. The case-study analyst's attention is consequently drawn to issues which are subjectively of most urgent concern.

The interplay between explanation and understanding which is made possible by combining quantitative and qualitative approaches yields some interesting conclusions. Areas which are better endowed with resources and experience lower transport costs to urban areas have benefited from a greater share of investment and have been better placed to respond the processes of intensification and the introduction of technological innovation. However, the underdevelopment of more peripheral regions such as Hermel has been the result of political choice, rather than a lack of resources, and their future will depend more on engagement with and influence of political processes than on technical assistance packages provided by extensionists. The value of a mixed method approach derives from a reframing of the knowledge required to promote the objectives of rural development, and its communication to the variety of interests with the power to achieve them, including particularly the international donor community whose influence on Lebanese policy is substantial.

Notes

[1] While Mount Lebanon was administered autonomously within the Ottoman Empire, Beirut, even though outside this self-governing administration, served as its *de-facto* political and economic capital. In 1920 the State of Grand Liban was created by adding to the city of Beirut and the regions of Akkar, the Beqaa Valley and South Lebanon to the Mount Lebanon region.

[2] Lebanese Ministry of Planning, cited by Gaspar (2004).

[3] Own calculation from Budget law and budget law proposals, Lebanese Ministry of Finance (2006)

[4] UNDP, MOSA and CAS (2006).

[5] Direct quotations from interviews have been translated from Arabic to English so as to be as close as possible to their meaning, which occasionally neglects formal English grammatical structure.

[6] In the Lebanese Arabic dialect, *Jerd* refers to remote mountainous areas, valleys and plains that exist between the mountains at relatively high altitude.

[7] A *dounoum* is an historic Ottoman unit of area, in Lebanon equivalent to 1000 m^2.

[8] Approximately 27,000-33,000USD. The Lebanese Central Bank has maintained a fixed exchange rate (1USD=1500LBP) since the mid 1990's.

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Appendix: Macro SAM for Lebanon 2005

in LBP billions	Activities	Commodities	Factors	Households	Government	Capital	RoW	Total
Activities		Sales **45,558**						Total domestic Production **45,558**
Commodities	Intermediate outputs **17,157**	Marketing margins **5,226**		Private consumption **28,801**	Government consumption **3,426**	Investment expenditures **7,074**	Exports **5,335**	Total marketed supply **61,793**
Factors	Value-added **27,964**							Total factor income **27,964**
Households			Income **24,464**		Transfers from government **3,605**		Remittances **7,849**	Total household income **35,918**
Government	Indirect taxes **437**	Import tariffs **2,642**	Government income from factors **2,166**	Income taxes and other **2,635**				Total government income **7,880**
Capital				Households saving **4,482**	Government saving **-926**		Foreign savings **3,519**	Total savings **7,074**
RoW		Imports **13,593**	Row income from factors **1,334**		Government income paid to RoW **1,776**			Foreign exchange outlays **16,702**
Total	Total cost of production **45,558**	Total absorption **61,793**	Total value-added **27,964**	Total household expenditure **35,918**	Total government expenditure **7,880**	Total investment **7,074**	Foreign exchange earnings **16,702**	