PROMOTING FARM / NON-FARM LINKAGES
FOR RURAL DEVELOPMENT IN EGYPT

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1. INTRODUCTION

In many low and middle income developing countries, the agricultural sector plays a vital role in terms of contribution to overall GDP, investments, employment and exports. Moreover, agricultural development is essential to economic growth in these countries as it stimulates output increases in nonagricultural sectors through various types of linkages.

Traditionally, agricultural and development policies have focused on agricultural growth with a concentration on the production side, often without careful assessment of its impact on the poor in rural areas. As poverty increased worldwide, a large body of recent research has concluded that the rural non-farm sector might provide a better way of increasing income and jobs for the poor, thus alleviating poverty. In this respect, evidence from international experience points towards the growing importance of interrelationships between farm and non-farm sectors to both national economies and rural households in developing countries.

While agriculture is a main activity in the Egyptian economy and remains the most important source of income and employment to the rural poor, research results have proved that poverty in rural Egypt cannot be significantly reduced by promoting agricultural growth in old lands alone (Kheir-El-Din and El-Laithy 2008). This is due to land scarcity and labor saturation, hence a low elasticity of agricultural employment with respect to growth in both agricultural value added and overall GDP. On the other hand, the rural non-agricultural sector is a sizeable sub-sector of the rural economy in terms of employment and incomes, and is assumed to be interlinked with the farm sector via various types of linkages. However, the non-poor are relatively more likely to benefit from the rural non-farm activities than the poor (El-Laithy 2008).

Accordingly, it is believed that enhancing agricultural growth along with promoting farm/non-farm linkages for rural development would achieve the twin objectives of overall high growth and poverty reduction, provided that the poor are not excluded from participating in this process.

This paper attempts to test this hypothesis with the main objective of empirically addressing the following questions:

1. What are the types and extent of interrelationships in Egypt between the agricultural sector and the rest of the economy on one hand, and between the farm and non-farm sectors, on the other?

2. Are the existing institutions capable of efficiently promoting the farm/non-farm linkages in a way that creates incomes and employment opportunities, hence developing rural Egypt and reducing poverty?

3. Do international experiences provide useful lessons to Egypt with respect to developing the non-farm sector and promoting its linkages with the farm activities?

4. How to promote rural development and how to enhance farm/non-farm linkages in the case of Egypt in order to create employment opportunities and income, especially for the poor?

To answer the above questions, the paper is organized into four sections in addition to an introduction and a conclusion. Following the introduction, Section 2 presents a conceptual framework that identifies the major types of farm/non-farm linkages and the different approaches to measure them. This section also presents some evidence from developing countries on the growing importance of those linkages and draws lessons regarding the policies needed to promote them. Section 3 highlights the importance of agriculture to the Egyptian economy in terms of its contribution to the main macro variables and measures production linkages between agriculture and the rest of the economy using an updated input-output table for the year 2007/08. As for Section 4, it identifies the farm/non-farm income and expenditure linkages, based on the latest households, income, expenditure and consumption survey, 2007/08. Section 5 addresses the efforts and policies needed to develop the non-farm sector and its relationships with the farm sector. In this respect, two specific issues are discussed. The first issue concerns the institutional reforms needed to promote rural development,

while the second relates to developmental activities and projects that enhance farm/non-farm linkages. Section 6 concludes.

2. CONCEPTUAL AND EMPIRICAL FRAMEWORK

Encompassing agricultural (farm) and non-agricultural (non-farm) activities, the rural economy is a key sector to most developing economies and to the livelihood of rural households in those economies. On one hand, the farm sector is interlinked with other sectors of the economy through many production linkages. Strengthening those linkages may have a strong positive impact on overall growth. On the other hand, the non-farm sector is of paramount importance to rural areas and is also interrelated to the farm sector through different production and expenditure linkages. Hence, promoting farm/non-farm linkages may contribute significantly to rural development and poverty alleviation.

In what follows, we first shed light on the different types of linkages between agriculture and other sectors of the economy and between farm/non-farm activities. The section will then present some evidence from developing countries on the importance and ways of promoting spin-off activities in the non-farm sector.

2.1. Different Types of Linkages

The dynamic interaction between agriculture and other sectors of the economy as well as the channels through which agricultural performance influences industrial growth have been widely analyzed in the literature. Two major types of agricultural/non-agricultural (farm/non-farm) linkages have been identified: production and expenditure.

Production linkages

They reflect how agriculture and other sectors are linked through the input-output relationship. In fact, the intersectoral transactions depend on the techniques used in agriculture, as well as on the growth of processing industries, which in turn depends on the level of income and export demand. While in the short run it is difficult to strengthen production linkages, structural changes in the production pattern of the

economy can enhance them in the long run, thereby affecting positively the overall growth of the economy (Rangarajan 1982).

Production linkages can be grouped into backward and forward, or up-stream and down-stream linkages (Benjamin et al. 2002). Backward production linkages refer to linkages from the farm to the part of the non-farm sector that provides inputs for agricultural production (agrochemicals, irrigation, electricity, transportation and machinery). Forward production linkages refer to the part of the non-farm sector that uses agricultural output as an input (processing and distribution of agricultural outputs such as food, cotton and tobacco). The analytical tool used to illustrate production linkages in national, regional or village economics is the Input-Output (I-O) or Leontief models.

Expenditure linkages

Households deriving income from one type of activity, farm or non-farm, are likely to spend that income on products of other activities. Expenditure linkages can be divided into consumption and investment linkages.

Consumption linkages refer to expenditures related to household consumption of farm and non-farm goods. The importance of such linkages drove economists to utilize expenditure system models to estimate household expenditure functions for various classes of goods: farm and non-farm, tradable and non-tradable. The estimated equations are used to ascertain farm/non-farm linkages by comparing the impacts of changing farm incomes on demand for these goods. In rural areas, demand is influenced by output changes in agriculture and also by the terms of trade. If the latter improves in favor of agriculture, those who sell farm commodities will benefit, and accordingly they will increase their demand for non-farm commodities, mainly industrial consumption goods usually bought by higher income groups.

As for investment linkages, they refer to expenditures used to finance farm or non-farm activities. An increase in agricultural output, or in returns on farm activities due to better terms of trade would have a positive effect on household savings, which

may be invested to initiate or expand non-farm activities (Benjamin et al. 2002; Rangarajan 1982).

In addition to the above mentioned approaches that dominated research on farm / non-farm linkages, that is I-O and expenditure system models, national social accounting matrices (SAM) are designed to capture the complex inter-linkages among production, institutions—including households—domestic investment, consumption and the outside world. Also, village SAM models are constructed based on the same conceptual framework as national SAMs, but they depart from the latter in specific ways related to the unique nature of village economies. Moreover, economists design village multiplier models to estimate farm/non-farm linkages. Their major strength is that they integrate the I-O and expenditure system approaches into a single model that captures all types of linkages. Finally, village computable general equilibrium (CGE) models are constructed combining the strengths of microeconomic household-farm models with those of SAM-based, village-wide models (FAO 2009).

2.2. Evidence from Developing Countries

There is mounting evidence that rural non-farm income, derived from wage-paying activities and self employment in commerce, manufacturing and other services, is an important resource for rural households, including the landless poor as well as rural town residents, thus helping them to escape from poverty. Spin-off activities can emerge from backward or forward production linkages with agriculture, or through expenditure linkages that come with rising agricultural income.

Reviewing numerous studies focusing mainly on farm households in Africa, Asia and Latin America, it was found that average non-farm income shares in the total income of households are higher in Africa (42 percent) and Latin America (40 percent) than in Asia (32 percent). Moreover, the studies indicated that the average shares of households in the rural population for which non-farm activity is the primary occupation for Asia and Latin America are 44 percent and 25 percent, respectively.[1]

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[1] It should be noted that a direct comparison between employment shares and income shares is difficult because the shares may differ as a result of wage rate differences.

Also, absolute employment in the rural non-farm sector grew much faster than farm employment and hence its share increased. For Latin America, nearly half of the countries witnessed negative growth for farm employment, while the rural non-farm employment growth rate was positive in all of them (Reardon et al. 1998).

The nature of non-farm activities differs significantly across regions and sub-regions. In Africa and South Asia, they tend to center around the countryside itself and depend mainly on agriculture, with little dependence on rural-urban links. They are mainly home-based and small-scale production. In Latin America, non-farm activities are based on linkages with agriculture as well as on tourism, mining and service sector activities. There is a tendency for rapid agro-industrialization in commercial agricultural areas, on a medium to large scale, as well as a tendency to mixed levels of capital intensity. As for East Asia, non-farm activities are characterized by a greater weight of urban-rural links, more advanced forms of business linkages, such as subcontracting arrangements in medium durables (vehicle parts), labor commuting as well as rapid agro-industrialization in commercial agriculture. Small and medium-scale enterprises (SMEs) are one of the non-farm income opportunities that became an important component in rural development. They provide additional income to farm families and also serve as a link between agriculture and industries and as an absorber of surplus labor in agriculture.

Given the importance of non-farm income to rural households, the policies that will be necessary if farm/non-farm growth linkages are to achieve their full potential are summarized in what follows (Reardon et al. 1998; Haggblade, Hazell, and brown 1988; Patrick, Simmons, and Winters 2007):

1. *Institutional aspects*: In this respect, three main aspects are reported. The first relates to the importance of contract farming as a mechanism that can help to overcome market and organizational failures, as compared to selling on the spot market. The state may act as a facilitator providing credit or technical assistance, and also by protecting the rights of contracted farmers through legislation (Birthal et al. 2009; Subrahmanyam 2000). As for the second institutional aspect, evidence from the

literature suggests that entry barriers, especially the lack of access to credit, may limit the ability of poor households to participate in non-farm activities. In this respect, the experience of Crédit Agricole in France is considered one of the successful experiences in providing loans to poor farmers; promoting savings using bonds; in addition to funding all agricultural as well as other commercial activities and newly created small enterprises in rural France and in the majority of developing countries, including Egypt. Also, Rabobank Poland achieved notable success in agricultural and rural development. Other entry barriers are poor infrastructure and lack of education. The third institutional aspect concerns agricultural extension activities that should give priority to more profitable crops and which depend on intensive rural labor. Extension planning and decision making should not be centralized in order to select the most appropriate crops for the local environment (Swanson 2004).

2. *Technological aspects*: In order to foster the development and expansion of farm/non-farm linkages, there must be an emphasis on improving agricultural technology. Governments must consider actions that simultaneously promote complementary non-farm activities (input supply and output processing) as well as agricultural technologies.

3. *Organizational aspects*: Given that agribusiness has emerged as a driver in creating linkages to agriculture, it is important that the state creates an environment that is conducive to investment in agribusiness activities. In this respect, of great importance is to promote producers' organizations and encourage farmers to actively participate in them. Producers' associations are rural associations where members gather to improve farm income through improving production, marketing techniques, local manufacturing and services activities that improve the quality of life in the village and rural development in general. International examples of these associations include the National Council for Dialogue and Cooperation of Rurals (CNCR) in Senegal; and CNER in Uruguay (Rondot and Collion 1999). Empirical evidence indicates that producers' associations played a crucial role in modernizing agriculture and in

protecting farmers' rights with the ultimate goal of enhancing the welfare of farmers and combating rural poverty (Bourgeois et al. 2006).

In addition to the role of the state in the above-mentioned aspects, it is important to note that NGOs and private entrepreneurs must play an important facilitating role in developing linkages by organizing farmers, providing credit, assisting with inputs and providing information on technology and contracts. It is also important to point out that poor farm households often lack the assets that serve as important capacity variables for participating in rural non-farm activities. Hence, enabling the poor to participate by improving their asset base is crucial.

The most successful international experiences in increasing farm and non-farm income and linking farmers to markets are India and China. In both countries, attention was focused on social capital development as explained in Putnam (2000), who stressed that this kind of development would create networks of people with similar developmental goals. He pointed out two types of social capital: networking and communication. Networking is a process where a network of people with one objective is created (for example, farmers' associations). Communication is the process of establishing linkages with external groups for the purpose of achieving a general goal. An example is establishing links between producers and exporters or wholesalers, which open markets for producers. The following is a brief analysis of the experiences of both country experiences.

The experience of China

Promoting farmers' associations is one of the approaches that contributed to turning the Chinese economy into a market economy. This shift started in 1979 and resulted in changing the structure of the agricultural sector to be in line with the new economic architecture. Changes included the shift toward cultivation of highly profitable crops and towards livestock projects with high economic return. Examples included expanding the cultivation of vegetables, apples and mushrooms in addition to raising ducks and pigs.

To help the owners of these farms to benefit from modern technology and available opportunities in the market, the Ministry of Agriculture conducted research and field studies and held conferences to arrive at the best ways of bringing rural households under the umbrella of rural associations. In most cases, networking was undertaken between specialized farms at the village level and higher levels such as the city and the state levels. The purpose was to create chains for marketing products in urban markets and collective purchasing of agricultural inputs at reduced prices, in order to achieve the goals of increasing rural and farm income.

According to 2002 statistics, the Ministry of Agriculture estimated the number of associations established throughout China at 100,000. These associations helped generate farm income and establish rural projects. They also assumed a significant part of the cost of agricultural extension activities resulting from the advice to shift to more profitable or higher yielding products.

These associations have also signed contracts with college professors and specialized advisors to provide technical assistance and training to members. Thanks to these associations, domestic extension services have also come to be provided based on market forces. Hence, farmers' associations in China can be described as multi-functional entities equipped with multiple tools to communicate with other tiers of social capital and to enhance relations with markets, traders, input suppliers and various other technology sources.

In parallel, efforts of the various agricultural and rural agencies were consolidated at a center called the Extension Center for Technological Agriculture, funded by the government. A law was also issued regarding agricultural extension methods and techniques, and local governments became responsible for providing facilities, equipment and funding to extension centers. These centers began providing training to farmers and Chinese women in cooperation with the Federal Women's Council (Swanson 2004).

The experience of India

Poverty reduction efforts in India focused on mobilizing farmers' efforts and modifying the system of agricultural extension in a way that contributes to comprehensive rural development. Examples included mobilizing the efforts of self-employed women and organizing them into groups that have come to play the role of "savings clubs." In other words, each member of the club contributes a certain amount periodically, and becomes qualified to draw a loan to start an economic activity. Through extension services members can also be linked to new marketing opportunities.

This experience succeeded in one of the districts of the Indian state of Orissa, and was attributed to the shift toward producing more profitable crops. In the district of Khurd in the state of Orissa, help was provided to landless women to operate fish farms with the support of fishery extension centers. They also started marketing their fish locally, then in the main cities of the state, until they extended their activity to major cities such as Calcutta. With more experience, they shifted to aquaculture and producing quality types of sweet water shrimp and marketing it in richer urban areas. With the profits, they managed to shift to more profitable activities such as raising livestock and milk production. Hence, extension services officials were able to network types of social capital at the village level, and link them to institutions which help these groups to access various markets.

The Indian experience has clearly shown that the extension system has helped small farmers shift to more profitable crops. It also helped create linkages between agricultural production, rural manufacturing, marketing and after-harvest transactions.

3. AGRICULTURAL SECTOR IN EGYPT: CONTRIBUTION AND PRODUCTION LINKAGES WITH OTHER SECTORS

Agriculture is a vital sector in Egypt. It is the main provider of food, raw materials for industries and exports. Although agriculture's contribution to GDP has declined over the past 25 years by almost 6 percentage points, its share in GDP remains around 13.5 percent. Agriculture is also the main employer, providing more than 26 percent of

employment, especially for women (45.5 percent of total female employment) (CAPMAS 2008). However, agricultural wages are less than 10 percent of total wages, reflecting low wage rates in this sector and high percentage of unpaid workers. Agriculture accounts for 11.8 percent of total exports of goods earnings and 20.5 percent of non-petroleum exports (Kheir-El-Din and El-Laithy 2008). The agricultural structure consists of around 65 percent of crop production and 35 percent of animal production. Vegetables, fruits, rice and maize are the main crops, while bovine and chicken are the main animal products.

Agricultural development may contribute significantly to increasing income in rural areas. This impact may be strengthened by developing other activities that are interlinked with agriculture, whether consuming its output or providing it with intermediate inputs as mentioned in the previous section. It is worth noting that the distribution of the employed by working status in rural areas reveals the importance of non-agricultural activities in providing job opportunities. These activities absorbed more than 45 percent and 37 percent of total employment in rural Lower and Upper Egypt, respectively. The overwhelming majority of non-farm employment in both areas is the wage workers category (Kheir-El-Din and El-Laithy 2008). These facts point to the importance of agricultural growth for rural areas, as well as the need to measure and identify production linkages between agriculture and other sectors of the Egyptian economy, which will be the core of this section that attempts to capture these linkages using the input-output (I-O) analysis.

3.1. I-O Analysis

This analysis allows measuring the impact of any change in final demand for the output of a given sector on generating additional output in all other sectors of the national economy. The I-O table offers a snapshot of linkages across production sectors at the national or regional levels.

Database

The input-output table provides the necessary data on the structure of the production system. It depicts the flows of goods and services between sectors for intermediate uses; value added produced by each sector, as well as final uses of its output. The balance of the input-output table reflects the correspondence between GDP and its uses in the system of national accounts.

The current study uses an updated input-output table for 2007/2008, based on the I-O table for 2002/2003 that was produced by the Ministry of State for Economic Development (MOED). It consists of 32 sectors. In the updated table for 2007/2008, the fertilizers industry is separated from other chemical industries due to its significant importance in the inputs structure of agriculture. Other chemicals include pesticides and chemical products. Food and textiles are also presented explicitly, while other manufacturing sectors are grouped in one sector. The updated I-O table consists of 12 sectors: agriculture; oil and extraction; food industry; textiles; fertilizers; other chemicals; petroleum products; other industries; electricity; construction; transport and communications; and other services. Table A1.1 depicts the input-output transactions matrix which highlights the intersectoral flow of goods and services for intermediate use. From this table, one could derive the technical coefficients matrix A shown in Table A1.2, which reflects the structure of intermediate consumption. Matrix A shows along any of its rows i the value of intermediate inputs that sector i provides to other sectors j to produce one unit of output in each of these sectors. Whereas each column j depicts the value of intermediate inputs necessary from all other sectors of the economy to produce one unit of output in sector j. Using matrix A one could also derive the Leontief inverse matrix $[I-A]^{-1}$ shown in Table A1.3. The elements of this matrix represent the total direct and indirect requirements of inputs from any sector i to produce one unit of final demand for sector j.

Defining intersectoral linkages

The elements in the rows of an I-O matrix represent sales of output from a row sector to other sectors, shown in the columns. The row sum represents forward linkages. The

column elements represent purchases of inputs by column sectors from other row sectors. The column sum represents backward linkages. In general, the larger the elements in the row and column corresponding to a given sector, the larger the sector's potential to stimulate growth through creation of forward and backward linkages.

Backward linkages measure the extent to which a unit change in demand for the product of a given sector j causes production increases in all other sectors. They are measured by the sum of any column of matrix A. Whereas forward linkages measure the extent to which a sector is affected by an expansion of one unit in all sectors. They are measured by the row sum in matrix A.

Leontief multipliers calculated from I-O matrices measure the multiplicative effect of changes in final demand for sectoral outputs. Final demand includes: household and government consumption, investment and exports, which are treated as exogenous variables. The column sum corresponding to any column of the Leontief inverse matrix measures direct and indirect backward linkages. As for total forward linkages, they are measured using the row sum of the Leontief inverse matrix derived from the technical coefficient matrix (i.e., intermediate sales as share of total sales including final demand).

In addition to backward and forward linkages, the list of potential linkages has been expanded in the literature, from production to consumption and fiscal linkages (effects of changing taxes and/or subsidies). A change in exogenous final demand for a given sector induces increased production of this sector and hence increased demand for intermediate inputs used in production of this sector. This leads to increases in production of all sectors. Demand for labor inputs increases correspondingly, thus raising incomes of households. These households in turn spend their new income on goods and services. Their expenditure represents a further increase in final demand, which may thus stimulate a new round of production increases. The increased household demand may thus generate important production linkages.

3.2. Measuring Inter-sectoral Linkages of Agriculture

A review of the literature on experimental studies in developing countries to measure inter-industrial linkages of agriculture reveals weak linkages in general, as compared to manufacturing sectors. Moreover, forward linkages of agriculture are greater than its backward linkages.

Results of the current study for Egypt are in line with conventional findings. I-O Table A1.1 shows that more than 40 percent of intermediate consumption of agriculture is own consumption of the sector's output (seeds, manure, fodder …), and about 23 percent come from services, while inputs from fertilizers represent about 9 percent. The technical coefficients matrix (Table A1.2) reveals that agriculture's use of its own production (represented by the diagonal coefficient of 0.0844) is bigger than its consumption of inputs from any other sector. The matrix also shows that food industry heavily depends on agriculture with input coefficient 0.3479, while textiles input coefficient from agriculture is 0.0133.

Table 1. Structure of Inputs of Different Sectors and Uses of Their Output (Ratios to Total Output)

Sectors	Direct backward linkage			Value added structure			Direct forward linkage	
	Intermediate inputs			Primary inputs			Uses of output	
	Domestic	Imported	Total	Wages	Operation surplus	Gross value added	Intermediate demand	Final demand
1) Agriculture	0.175	0.025	0.2 (11)	0.151	0.649	0.8 (2)	0.428 (4)	0.572
2) Oil and extraction	0.09	0.014	0.104	0.02	0.878	0.898 (1)	0.586	0.414
3) Food industry	0.498	0.312	0.81 (1)	0.09	0.104	0.194	0.279	0.721
4) Textile	0.488	0.255	0.743	0.06	0.199	0.259	0.328	0.672
5) Fertilizers	0.325	0.271	0.596	0.17	0.234	0.404	0.821 (1)	0.179
6) Other chemical	0.425	0.145	0.57	0.1044	0.3263	0.4308	0.369	0.631
7) Petroleum products	0.717	0.011	0.728	0.081	0.191	0.272	0.595	0.405
8) Other industries	0.315	0.27	0.585	0.1127	0.3030	0.4158	0.255	0.745
9) Electricity	0.31	0.1	0.41	0.2072	0.3831	0.5904	0.352	0.648
10) Construction	0.426	0.126	0.552	0.1506	0.2973	0.4478	0.089	0.911 (1)
11) Transport & communication	0.244	0.035	0.279	0.1300	0.5910	0.7210	0.106	0.894
12) Other services	0.226	0.062	0.288	0.2674	0.4446	0.7120	0.191	0.809

Source: Authors' calculations.

* Numbers in parentheses represent the ranking of the sector compared to other sectors.

Table 1 displays direct backward and forward linkages of all sectors of the 2007/2008 I-O table. Agriculture's consumption of inputs produced in other sectors (direct backward linkage) represents 20 percent of its total output, and compared to other sectors agriculture is ranked 11th among the 12 sectors, while food industry ranks first. Direct forward linkage, which represents the ratio of any sector's output that is used by other sectors as input, is 42.8 percent for agriculture; it ranks (4th), while fertilizers rank first.

There is a positive side to the weak backward linkages of agriculture: that the sector is highly ranked (2nd) in generating value added. This means that while agriculture is not effective enough in stimulating growth in other sectors through its demand for their output, it is effective in supplying other sectors with required inputs and in generating a relatively high value added.

Table 2.Total (Direct and Indirect) Inter-Industry Linkages

Sectors	Total backward	Total forward	Expanded backward	Total labor requirements
Agriculture	1.233 (11)	1.597 (4)	1.675 (11)	0.046 (1)
Oil and extraction	1.116	1.864	1.190	0.002
Food industry	1.630	1.352	2.022	0.023
Textiles	1.708	1.446	2.122	0.036
Fertilizers	1.416	2.310 (1)	1.906	0.009
Other chemicals	1.590	1.479	1.988	0.006
Petroleum products	1.820 (1)	1.796	2.122	0.007
Other industries	1.440	1.312	1.858	0.011
Electricity	1.352	1.471	1.865	0.023
Construction	1.637 (3)	1.107	2.169 (1)	0.024
Transport & communication	1.345	1.135	1.732	0.013
Other services	1.312	1.264	2.028	0.024

Source: Authors' calculations.

Table 2 displays total backward and forward linkages, which take into consideration the multiplicative effects of changes in final demand (for backward linkages) or in primary inputs (for forward linkages) of each sector on output of all sectors, and are derived from Leontief inverse matrix $[I-A]^{-1}$ (Table A1.3). These total linkages are larger than direct linkages. Total backward linkage of agriculture is 1.233 and total forward linkage is 1.597. Table 2 also reveals that regardless of increased total linkages, ranking of agriculture in both measures did not change (11th and 4th, respectively).

Expanded measures of linkages include "induced effects," which take into consideration the effects of increased production on income of households (mainly labor remuneration), which in turn generates another round of increased demand on goods and services according to the consumption pattern, and this in turn, stimulates production of all sectors at varying rates.

Measures of induced effects are derived by expanding the matrix of input coefficients to include households as an additional sector. The column corresponding to the household sector represents its consumption from output of different sectors, while the corresponding row represents the consumption of different sectors from household services, i.e., labor remunerations. Leontief inverse is then calculated for the expanded matrix. The sums of columns represent the expanded backward linkages of each sector, and the difference between these measures and total backward linkages represents the induced effect of households spending.

Table 2 shows that expanded backward linkages are bigger than total backward linkages for all sectors, and that the ranking of some sectors has changed. Construction moved from third to first rank, while agriculture's rank did not improve (11th).

Finally, available additional data on employment (by number of workers) in different sectors in 2007/2008 enabled to measure total labor requirements that could be generated in case of increased final demand by one unit in a given sector. Although employment data are not expressed in monetary units as the I-O Table, it is possible to calculate direct labor requirement per one monetary unit of output in different sectors

(li), and multiplication of these coefficients by Leontief inverse matrix $[I-A]^{-1}$ produces total labor requirements (Li) in different sectors corresponding to the increase in final demand by one LE in a given sector.

Results presented in the last column in Table 2 show that one unit of final demand in agriculture requires 0.046 units of labor in all sectors. This is the highest coefficient among all sectors, which gives agriculture the first rank in terms of impact of its expansion on stimulating labor opportunities.

3.3. Main Findings

These results reveal weak backward linkages of agriculture, and reasonable forward linkages. They reflect the conventional role of agriculture in providing raw materials and intermediate inputs to other sectors, while its intermediate consumption of other sectors' output is not significant in its cost structure.

When the additional effect of household expenditure of part of their income—as providers of labor inputs—on consumption of output of different sectors is taken into consideration, measurement of expanded backward linkages of agriculture does not show improvement. One interesting result is that ranking of agriculture according to backward linkages does not change in all variants: direct, total and expanded measures.

High intensity of labor in agriculture is reflected by measures of total labor requirements corresponding to one LE of final demand, as results show that agriculture ranks first among all sectors. It is worth noting here that a distinction should be made between the concept of labor-intensity and that of employment-intensity. While the first refers to the nature of the production technique prevailing in an activity and whether it uses more labor or capital to produce one unit of output, the second refers to the number of jobs generated by increased output of this activity. In other words, the concept of labor intensity refers to an average concept (E/Y), while employment intensity or elasticity refers to a marginal concept $\dfrac{dE/E}{dY/Y}$, where E and Y represent employment and output, respectively. Agriculture may be labor intensive, but due to

certain considerations—such as land scarcity and labor saturation —does not generate many jobs in a certain period. Consequently, the employment elasticity of output in this sector would be low (El Ehwany and El Megharbel 2009). Recent research on Egypt has proven that employment elasticity with respect to growth of value added in agriculture is weak, ranging between 0.287 (Kheir-El-Din and El-Laithy 2008) and 0.32 (El Ehwany and El Megharbel 2009). This implies that enhancing growth of agriculture alone would not be sufficient to create job opportunities and income for rural areas.

Considering previous results, some policy implications could be drawn. In order to create jobs and raise income in rural areas, especially for the poor, it is imperative to enhance development of non-farm activities that heavily use agricultural products as inputs (e.g., food industries and textiles).

In addition to production linkages between agriculture and other sectors of the Egyptian economy highlighted in this section, the potential links between farm and non-farm sectors are manifested in two ways. First, through farm and non-farm employment and income links; and second, through demand for farm and non-farm product links. These issues are addressed in the following section.

4. FARM AND NON-FARM INCOME AND DEMAND LINKAGES

A large body of recent research has concluded that non-farm activities may be considered as a route out of poverty, and that the impacts of non-farm activities on growth and inequality depend on the type of non-farm employment in terms of education and skills as well as income share of non-farm activities. De Janvry and Sadoulet (1993) argue that in land-constrained areas of the developing world, focusing directly on the rural non-farm sector might provide a better way of increasing income and employment opportunities for the poor. In this view, income earned in the rural non-farm sector represents the agent of positive change for the poor in the rural economy, rather than income earned from the traditional agricultural sector.

Meanwhile, empirical evidence demonstrated the presence of a positive and significant correlation between farm and non-farm income and employment, leading to multiplier effects of productivity growth in agriculture, and highlighted the importance of rural roads in augmenting these inter-linkages (Hazell and Haggblade 1990; Hazell, Holden, and Pritchard 1991; Lewis and Thorbecke 1992; Reardon and Timmer 2007). Empirical results also highlight the need for improved connectivity of regions with higher agricultural potential to urban centers for stimulating growth in high return wage employment and self-employment in non-farm activities.

This section attempts to shed light on farm and non-farm linkages in Egypt in terms of income and demand, as revealed from the 2008/09 Households Income, Expenditure and Consumption Survey (HIECS). Before exploring these linkages, a brief description of the employment profile in rural Egypt is presented.

4.1. Farm versus Non-farm Employment by Region, Expenditure Quintiles, Gender and Education

In 2008/09, more than half of the employed is engaged in agricultural activities (53 percent, compared to 57 percent in 2004/05). By disaggregating employment into wage workers, self-employed and unpaid workers, different patterns of employment categories are observed. Farm self-employment represents half of employment in agriculture (24 percent of all rural workers), while wage workers are the most important category for non-farm employment (37 percent of all rural workers) (see Table A2.1 in the Appendix).

Farm employment is more important in rural Upper Egypt, where 56 percent of the employed are engaged in agricultural activities. However, it is less important in rural Lower Egypt (50 percent). When employment is further disaggregated, differences between regions become more apparent. About 39 percent of the employed are non-farm wage workers in rural Lower Egypt, and the corresponding figure for rural Upper Egypt is lower by around 5.5 percentage points. One out of five employed persons in rural Lower and Upper Egypt are unpaid agricultural workers representing 20 percent and 21 percent, respectively. Wealthier regions in rural Lower Egypt

19

exhibited a larger share of non-farm employed persons, especially wage workers (Table A2.1).

The non-poor are relatively more likely to be employed in non-agricultural activities than the poor. While around 40 percent only of the working population in the poorest quintile are employed in non-agricultural activities, almost 55 percent of working population from the richest quintile are active in these activities (Table A2.2). On the other hand, one out of five employed in agriculture in the first quintile is unpaid worker and another one is self-employed. Individuals in the two poorest quintiles have a lower likelihood of establishing their own businesses as independent workers outside agriculture. Differences in distribution patterns of employed among various quintiles suggest that non-agricultural employment attracts a larger share of employed in the higher expenditure quintiles.

The importance of farm employment for women is reflected by the fact that in 2008/09, 80 percent of all rural women in the labor force are engaged in the agricultural sector, compared to only 40 percent for men.

Educational attainment appears to be an important determinant of employment in the farm or non-farm sectors. Employed population with higher education level is more likely to be engaged in non-farm activities, particularly as wage workers. Lack of education may be considered as an entry barrier that prevents the poor in Egypt from being engaged in non-farm activities.

4.2. Farm and Non-farm Income in Rural Areas

The results that emerged from the analysis of employment are confirmed by analyzing income in rural areas.

Income sources

In 2008/09, non-farm income from wages and self-employment in all rural Egypt contributed, on average, about 43 percent of total income (Table A2.3), while agricultural wages and self-employment contributed about 32 percent and other income sources such as rent and transfers provided 25 percent of total income. It is clear that

non-farm sector is an important source of income, even at this highly aggregated national level. Examining the contribution of farm/non-farm sources to total income across different per capita expenditure quintiles indicates that agricultural income is more important than non-agricultural income for the lowest quintile. The contribution from agricultural sources exceeds 38 percent of total income for the lowest expenditure quintile, while it is 12 percentage points lower for the highest quintile. Taking all non-farm income sources together, Table A2.3 suggests that the importance of non-farm income is unevenly spread across quintiles. It generally increases with the level of household spending.

The importance of non-agricultural income as a way out of poverty is more apparent when the relative importance of farm and non-farm activities in rural income is considered. Across quintiles, the share of income from self-employment in non-agricultural activities rises with living standards, as shown in Table A2.3.

Diversification of income

Since the 1970s, a large number of studies have investigated the role of non-agricultural economic activities for rural development. Evidence from the developing world suggests that economic diversity in rural areas has the potential of fostering local economic growth and alleviating the rural-urban income gap and rural poverty. The majority of studies in the existing literature on rural non-farm activities focuses on the diversification of income sources over rural space, or over groups of households within the rural space.

Two factors that may determine income diversification have been identified: Distress-push diversification and demand-pull diversification. The first typically occurs in an environment of risk, market imperfections, and of hidden agricultural unemployment, and is typically triggered by economic adversity that reduces household income. Engaging in economic activities that are less productive than agricultural production could be on a full-employment basis, and is motivated by the need to avoid further income decreases. The second, on the other hand, occurs as a

response to evolving market or technological opportunities, which offer the opportunity of increasing labor productivity and household incomes. This distinction suggests a number of specific inferences in terms of the relationship between diversification strategies, household characteristics and the socio-economic environment.

Distress-push diversification will dominate in rural areas characterized by the following features: geographical isolation, low-quality physical infrastructure, low human capital, underdeveloped markets, resource scarcity, or recent shocks to the natural environment, the economic system, or the agricultural sector. Demand-pull diversification would be possible in the presence of expanding technological innovations (whether within or outside agriculture), market development, or intensifying links with markets outside the local economy (Davis and Pearce 2001). Within rural areas, distress-push diversification attracts rural households that are less well-endowed or have lower incomes. These households will enter non-agricultural activities that are, on average, less rewarding (e.g., in terms of labor productivity) than demand-pull diversification activities, since the higher-return activities typically require higher investment that only the richer households can afford.

To examine rural diversification, we begin by looking at the share of income from rural income generating activities, as well as household participation rates in the different rural income generating activities.

To investigate the link between diversification of income of a household and its living standard, households were classified into seven categories depending on their sources of income. These categories are: (1) income from agricultural activities only; (2) income from non-agricultural activities only; (3) income from both agricultural and non-agricultural activities; (4) income from agricultural activities and unearned income (income from properties, financial assets and transfers); (5) income from non-agricultural activities and unearned income; (6) income from agricultural and non-agricultural activities and from

unearned income; and (7) non-labor income only (income from properties, financial assets and transfers).

In 2008/09 and in rural Egypt, very small percentages of households depend solely on earned income, whether from agricultural or non-agricultural activities or from both. Those households represent only 1.65 percent of households. Over one quarter of households (27 percent) obtain their income from agricultural activities and other unearned income sources. Less than one third of households (29 percent) depends on non-agricultural activities and unearned income to sustain their livelihood. The majority (39 percent) diversify their income from agricultural and non-agricultural activities and from non-labor (unearned) income as well (see Table A2.4).

This pattern is somewhat different when we look at different quintiles. Table A2.5 shows that the distributions of households with agricultural income only, or with agricultural income and non-labor (unearned) income are skewed towards lower quintiles, but they are skewed in the opposite direction for households with non-agricultural income only or with non-agricultural income and non-labor income.

These results are consistent with the well-known fact that households depending only on agricultural activities are more susceptible to income fluctuations and hence are concentrated in lower quintiles, while households who diversify their income from labor have more stable income. This diversification of income is related to better human capital endowments (education and skills).

In Egypt, both demand-pull and distress push diversification coexist. Two clusters of high-return and low-return activities, where affluent and poor households are engaged in respectively, are observed. Distress-push diversification dominates poorer households whereas higher income households benefit from demand-pull diversification as they are more likely to be engaged in higher productivity non-agricultural activities.

To sum up, profiles discussed in this sub-section are useful in summarizing information on households' farm and non-farm employment and its relation to welfare levels in rural Egypt. It is evident from the analysis that the non-farm sector is a heterogeneous collection of activities which includes productive and non-productive occupations. The latter are more in the nature of residual activities into which people are pushed when other sources of income (from agriculture, rents, transfers…) are not sufficient to make ends meet. For the poor, these activities contribute to their income, but they do not actually generate significant returns. Promoting linkages between farm and non-farm activities would thus require, aside from growth of agricultural output, increasing demand-pull diversification along with enhancing human resource development in rural areas. This would ensure increasing productive activities that contribute to poverty alleviation.

4.3. Patterns of Consumption

Table A2.6 summarizes the patterns of spending across expenditure quintiles. Budget share for food decreases as expenditure increases, where the poorest quintile spends 53 percent of its budget on food, compared to 45 percent for the richest quintile. On the other hand, budget share of non-food but essential items such as health care, transportation, communications, recreation and education decreased as income increases, reflecting that the poor have to give up expenditure on health and education to fulfill their needs of food. Budget shares of cereal, oil, and vegetables decrease as income increases, while the share of meat, sugar and other food products categories are about equal across all quintiles. Although the poor spend a higher budget share on food, their per capita expenditure on food is much lower than their rich counterpart. On average, every person in the richest income quintile spends 1.8 times per capita expenditure of the poorest quintile. The gap between the rich and the poor (in terms of their share in per capita expenditure) is smaller for food compared to the overall average. On the other hand, the gap between per capita expenditure on non-food

goods and services for the richest quintile is almost three times the per capita expenditure for the poorest quintile, especially health care, transportation, communications, recreation and education. It is evident therefore that as income rises, the demand for non-food items increases faster than for food.

Previous analysis showed that households with purely agricultural income or agricultural income coupled with other sources of income are more likely to be found in the poorer quintiles. On the other hand, households who derive most of their income from non-farm activities are more likely to be found in richer quintiles. Given that consumption pattern varies with income, and that households deriving the larger share of their income from non-farm activities are better off, hence enhancing non-farm sector would create job opportunities and incomes, which will lead to more spending on non-food products. This will in turn increase the production of other non-farm goods and services and will ultimately increase the welfare of rural areas.

4.4. Agriculture and Non-Agriculture Growth Links

Because of its forward and backward linkages, agricultural growth has important spillover effects on the rest of the economy. The farm and non-farm sectors are linked in two ways: through farm and non-farm employment and income links, and through demand for farm and non-farm production links.

The expansion of the off-farm sub-sector can have a further impact on agricultural employment and income in two ways: (i) directly by creating alternative job opportunities for unpaid or poorly paid workers in agriculture, thus raising their income; (ii) indirectly, by raising agricultural productivity. This rise in agricultural productivity may occur in two ways. First, if there are several production technologies or crops with higher average productivity, having an alternative secure source of income may make farmers more willing to choose the options that involve higher risk and higher return. Wealthier farmers are often the first to adopt new agricultural technologies. Second, in the absence of low-

cost credit, additional income from outside farming facilitates the purchase of costly inputs.

Agricultural growth is expected to boost non-farm but related activities such as trade and construction activities. On the other hand, as farmers' income increases from increased agricultural outputs and sales, they spend a large share of their income on locally produced goods and services. Small and micro enterprises are likely to be encouraged in construction and brick making, tailoring, household repair services, transportation, as well as various trading activities (World Bank 2007).

This suggests that policy makers seeking to maximize the impact of an expanding non-farm sector on living standards in rural areas should concentrate on removing the barriers to entry in the non-farm sector. This involves first and foremost, improving education levels in rural areas. It also involves improving infrastructure, roads and means of transport.

5. OPPORTUNITIES AND POTENTIALS FOR ENHANCING LINKAGES BETWEEN FARM AND NON-FARM ACTIVITIES IN EGYPT

To enhance rural development and reduce rural poverty, efforts are needed to create new ways of generating rural income. Before exploring these efforts in light of the international experiences referred to in Section 2, we will briefly highlight the current status of agricultural and non-agricultural institutions responsible for creating linkages between farm and non-farm activities.

5.1. Current Institutional Status

Institutions associated with agriculture and rural areas are multiple. The following are some of the most important of these institutions in terms of presence and accomplishments.

Agricultural extension system

The agricultural extension system in Egypt has been related to the agricultural policy, which went through the totalitarian and centralized era of the 1960s and extended until the mid-1980s. Under this system, the government determined the crop composition, and applied the mandatory delivery of crops. Following economic liberalization, which started to reflect on the agricultural sector in the form of increasing prices as of the 1990s, the system had not improved to cope with these changes that introduced market forces as the main engine of agricultural activities. The role of the extension system declined and became stereotyped and unable to address the dynamics of the current conditions.

Agricultural cooperatives

The number of agricultural credit cooperatives stands at 4,242 in 2007/08, covering all rural areas of Egypt. These cooperatives comprise more than 3.6 million members, and their capital amounts to more than LE 60 million. Moreover, the number of cooperatives under the umbrella of the General Authority for Agricultural Reform stands at 761 with 365 thousand members. The number of "marine wealth" cooperatives amounts to 94 associations with about 93 thousand members and with a capital of more than LE 1.6 billion. These cooperatives seek to improve and modernize fishing boats, and provide jobs to about 75,000 fishermen (CAPMAS 2007/08). Agricultural cooperatives in Egypt played a historical role and were very successful in supporting the state's economic policies at the time. As a state instrument, cooperatives achieved remarkable success in the provision of production inputs and product marketing. However, cooperatives can no longer cope with the changes in the economic scene towards more liberalization and competitiveness. Current key constraints include legislative obstacles, shortage of financing, lack of a collective spirit, in addition to marketing obstacles.

Civil society organizations

In 2009, the number of civil society organizations stood at 30,000 operating in about 20 areas of services provision. Many of the existing organizations aim to improve services and promote the status of low-income families. However, the weak institutional setup of these organizations and limited available financing prevent achieving significant results in combating and alleviating poverty. For instance, one study shows that profits of microenterprises (e.g., handmade rugs and palm products) that depend on loans from an organization concerned with supporting female heads of households—representing 25 percent of total families in Fayoum—do not cover minimum household needs. These enterprises cannot continue production without continually obtaining loans due to the low value of loans and high interest rate. Furthermore, market dominance by large traders and the inability of women to efficiently market products reduce the feasibility of these enterprises (Sadek and Saadawi 2005). Also, the lack of training and marketing opportunities in addition to the absence of a civil society work strategy represent barriers to achieving significant returns in the area of rural development.

The Principal Bank for Development and Agricultural Credit (PBDAC)

Established in 1931, the *PBDAC* is considered Egypt's primary instrument in implementing the agricultural credit policy. During the period 1964-1986, the Bank was assigned the task of supplying and distributing agricultural inputs at set prices; receiving key products and crops that come under the mandatory delivery system based on a certain quota and pricing system; and providing credit at subsidized interest rates. In the beginning of economic liberalization in agriculture, the Bank no longer had a monopoly of agricultural credit policy and was competing with other banks in this respect.

The Bank provides credit facilities in three main areas: short-term loans for trading, manufacturing and marketing agricultural production; long- and medium-term loans for developing agricultural production; and loans for rural, environmental and professional development projects (short- and medium- term). The latter includes

service activities, outlets and rural activities that are the concern of this study. The Bank's contribution in funding small enterprises amounts to about 24 percent of total funding provided by all banks.

Economic liberalization policy in the agricultural sector was not associated with real liberalization in the institutional setup of agricultural funding and credit. Therefore, farmers (4 million landholders deal with the bank) continued to depend on the Bank as the sole entity in this field and deal with it as an organization supporting farmers (through low interest rate financing, debt write-offs or agricultural debt rescheduling). These issues accumulated and persisted leading to increased cost of funding and decline of capital adequacy indicators in a way that reduced equity's ability to cover bank loans (PBDAC 2008).

Social Fund for Development (SFD)

The SFD was established in 1992. It adopts a set of development policies in the area of small and micro enterprises, as well as social and human development. In spite of its wide scope of activities, SFD efforts in rural development are limited, implementing only one program in this respect that aims at "increasing village household incomes" under the microenterprises development policy.

Local Development Fund (LDF)

The Local Development Fund started operating in November 1979. In the beginning, it aimed at developing village local units by granting these units concessional loans to implement pilot for-profit production projects. Under the economic liberalization policy, a prime ministerial decree was issued in 1990 to sell the economic units owned by local units, including enterprises funded by the LDF. The Fund's work strategy was revisited to allow the Fund to grant direct loans to youth, women and other categories that need to establish small enterprises that will contribute to economic development in villages. Priority was given to enterprises in Upper Egypt, as well as in remote and frontier regions.

Although the Fund covers all governorates and regions, total loans granted since its establishment until 2007 stood at only LE 231.8 million, averaging 64.1 thousand enterprises with LE 3616.8 per enterprise on average. This reflects the Fund's limited impact in generating farm and non-farm income and in creating job opportunities. Moreover, loan terms and interest rate (9 percent), and periodic reports required on the project's progress represent constraints on beneficiaries and development activities. Another constraint is the maximum loan value, now standing at LE 20,000 to fund equipment, furnishings and operational costs for one cycle (the loan value for handicraft workshops is LE 50,000).

Rural development fields covered under the Fund's credit policy include agricultural and animal production, agricultural manufacturing, handicrafts and environmental industries, small and micro industries, particularly those based on simple technologies and those feeding other industries, handicraft workshops (e.g., carpentry, furniture), electrical appliances repair, manufacturing of agricultural machinery, shops, bakeries, restaurants and computers.

Loan beneficiaries are individuals (women, particularly female heads of households, receive 30 percent of loans), companies (sole proprietorships), cooperative associations and civil society organizations.

To conclude, there are existing imbalances and weaknesses in the institutional aspects related to rural development that accumulated over the years due to practices of totalitarian regimes. Such imbalances still stand in the way of meeting requirements of economic liberalization and competition.

5.2. Opportunities and Potentials

It is well-known that agricultural growth impacts positively the rural sector through generating farm income; creating agricultural jobs; and expanding marketing and trading opportunities for agricultural commodities. Moreover, agricultural growth creates opportunities for rural investment and for establishing agricultural and non-agricultural projects.

Although agricultural income has increased in recent years, as the feddan's net yield at fixed prices increased from LE 684 on average during 1980-1985 to LE 1,046 in 2007 at an annual growth rate of 1.7 percent, many constraints impede the ability of the farm sector to grow and to provide jobs. Among these constraints are ownership segmentation, change of the population composition in rural areas, as well as the low employment elasticity with respect to agricultural value-added growth due to scarce land and saturation with labor. Accordingly, it is critical to look for non-farm income resources and job opportunities in the Egyptian rural areas. It is worth mentioning that non-agricultural income is more important in the case of small-sized landholdings, where small landholders (less than one feddan) get 95 percent of their income from non-farm sources contrary to larger landholders (Ministry of Agriculture 1977). These facts show the necessity of paying attention to enhancing linkages between farm and non-farm activities, and creating opportunities to generate non-farm income. In this regard, we explore two key issues, namely: institutional reform and the potentials for establishing developmental projects that enhance linkages.

Restructuring institutions concerned with integrated rural development

Achieving significant results in creating linkages between agricultural and non-agricultural projects requires complete institutional restructuring rather than partial remedies of the legislative, regulatory and funding aspects. This is in line with the new institutional economics and international experience, which stress that "the second generation of development challenges" are concerned with creating the institutional setup required for market mechanisms, with market reforms being the first generation (Al Shaer 2007). According to the current study, restructuring institutions requires unconventional remedies such as:

1. Agricultural extension: strategies should be modified to cope with the following international developments:

    a. Linking agricultural research and extension to serve market needs; strengthening linkages between agricultural extension and research, and giving a

relatively larger weight to programs that target public interest (reducing pollution and stopping the wasting of resources).

b.   Building human capital and organizing farmers' groupings (associations, unions, etc.), and linking them to markets.

c.   Decentralization of planning of implementation of extension programs.

d.   Consistency of legislations and linking them to institutions (cooperation, funding and credit; agricultural marketing; and farmers' groupings) in accordance with the extension strategy.

e.   Providing infrastructure requirements and institutional frameworks that enable specialization of agricultural regions and areas, and contracting between small farmers and companies.

Other roles that the extension system can play to increase farm and non-farm income include: reducing waste; recycling agricultural waste (plants-animal) and establishing activities and industries based on them. To sum up, agricultural extension should be concerned with rural development issues rather than merely focus on a certain commodity or activity.

2. Agricultural cooperatives and the Principal Bank for Development and Agricultural Credit:

Laws, regulations and funding sources should enable institutions, separately or collectively, to:

- Establish companies that undertake agricultural and non-agricultural investment activities that achieve the goals of integrated rural development and operate competitively in accordance with market forces.

- Reduce government interference, centralization and administrative red-tape.

- Enhance cohesion and integration of roles in rural development areas.

Key steps required include developing and issuing a new law for cooperatives to help make them economically independent units, capable of competing in the market

and partnering with the private sector in agricultural and non-agricultural areas of production. It would also help them establish income-generating projects and manage them according to economic principles, provided that support for the administrative and financial decentralization of cooperatives' activities be one of the pillars of the new law. Agricultural cooperatives should also act collectively to compensate for the role traditionally assumed by the government in providing production inputs and marketing. Regarding the Bank, the draft law submitted by the government may meet several restructuring requirements. This may contribute to activating the Bank's role in establishing companies that support agricultural and rural development projects, and allowing the establishment of small and medium enterprises to replace the bank in providing production inputs (NDP 2008).

3. Civil Society Organizations

Civil society organizations concerned with rural development should take the following into account:

- Stop random social and developmental work in rural areas.

- Merge small-sized associations to work according to economies of scale, and establish linkages between them and larger associations.

- Avoid duplication and repetition of goals and activities.

- Focus on developmental projects that generate income and provide jobs.

- Enhance human capabilities and training potentials, and establish specialized retraining centers that suit local needs in each region.

Successful models that should be evaluated and emulated in the area of agricultural and rural development include the Horticultural Export Improvement Association (HEIA), the Federation of Poultry Producers, Horticultural Development Association, and Al Shams Associations established under law no. 84/2002 regulating civil society organizations.

4. The Social Fund for Development

The SFD should pay more attention to rural development given that rural areas deserve favorable treatment due to lack of capabilities and low incomes. It should also focus on technical assistance. A survey conducted in 2003/2004 showed that small and micro enterprises funded by the Social Fund for Development have obtained non-financial services representing 0.5 percent only (UNDP 2008). Moreover, the SFD should exert more efforts to increase micro loans provision through increasing usage of civil society intermediaries in all credit, training, and non-financial services.

Figure 1 illustrates a proposed model for the role of agricultural and non-agricultural institutions in enhancing linkages between farm and non-farm activities.

Figure 1. Proposed Model for Agricultural and Non-Agricultural Institutions' Role in Enhancing Linkages between Farm and Non-Farm Activities
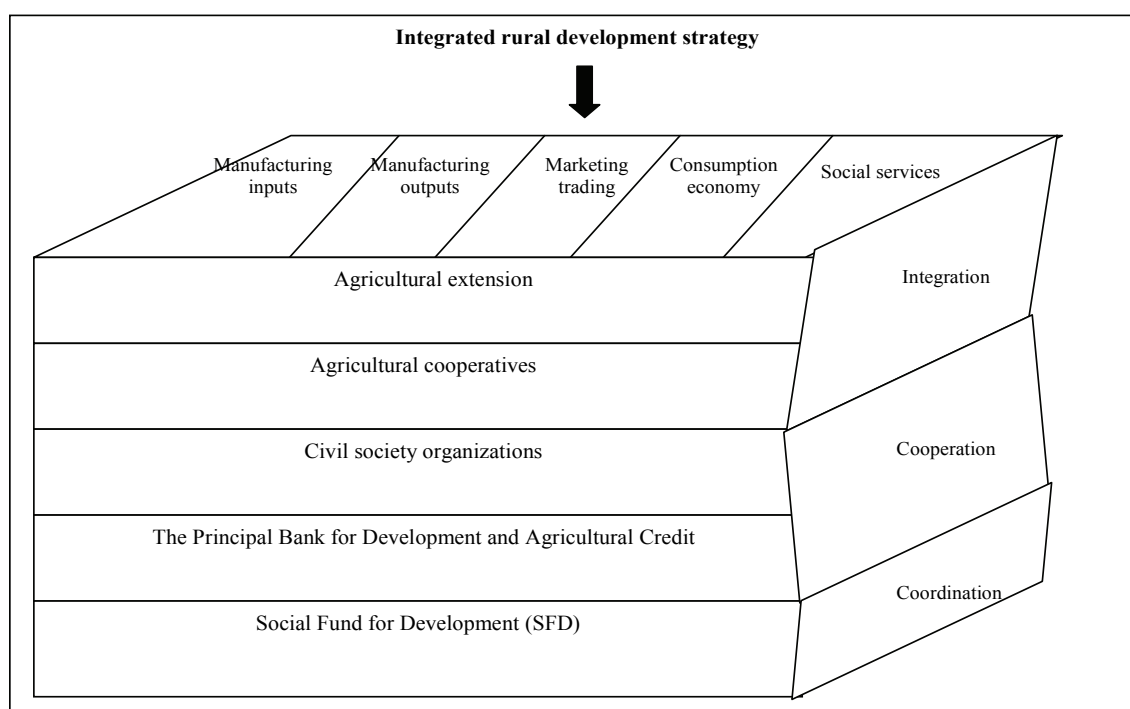
Developmental activities and projects that enhance linkages between farm and non-farm activities.

The key activities and small and medium enterprises through which partnership and linkages could be established include the following:

1. Manufacture and trade of agricultural inputs such as organic fertilizers;

2. Manufacture of plant, animal and fish outputs such as agricultural and food industries (e.g., juices, jams, pastry and sauces); drying, packaging and exporting medicinal and veterinarian plants; oil extracting; and dairy industries;

3. Achieving vertical integration between production, marketing, manufacturing and exporting, by establishing centers for sorting and packaging the various vegetables and fruits exports; and linking small farmers to these centers and markets;

4. Benefiting from unutilized agricultural production capacity, such as establishing apiaries and manufacturing honey production requirements as well as marketing thereof. Agricultural extension may join forces with the SFD in these projects due to the Fund's previous experience in financing honey production projects. Figure 2 illustrates the role of agricultural and non-agricultural institutions in enhancing linkages between farm and non-farm activities.

5. Establishing agricultural and non-agricultural industries and activities based on resource specialization, to achieve regional specialization and larger potential for specialization at the level of *marakez* (towns) and villages as follows:

a. Regional specialization:

Upper Egypt: activities related to sugarcane and wood; manufacture of dates in the New Valley, and jojoba and gazon trees (to produce organic fuel).

Central Egypt: activities related to medicinal and aromatic plants and the drying, manufacturing and packaging thereof; as well as contract production of crops such as vegetables, garlic, onion, and aromatic oils and pastry.

East Delta: contract production and manufacturing and exporting of potatoes, strawberries and tomatoes; and establishing factories for juice, concentrates and dried products.

West Delta: projects based on partnership and integration between small farmers and agricultural firms; technology transfer; activate the role of civil society in projects related to removal of landmines in the northern coast; the use of demined lands and benefiting from international organizations in this respect; opportunities

and incentives for aquaculture and its related activities; establish agricultural-industrial complexes; and develop pastures.

Central Delta: provide infrastructure and institutional structure to maximize benefits from regional specialization in producing poultry, fish, dairy products, and cotton flowers; and improve rural and environmental industries.

Figure 2. Illustration of the Role of Agricultural and Non-Agricultural Institutions in Enhancing Linkages between Farm and Non-Farm Activities
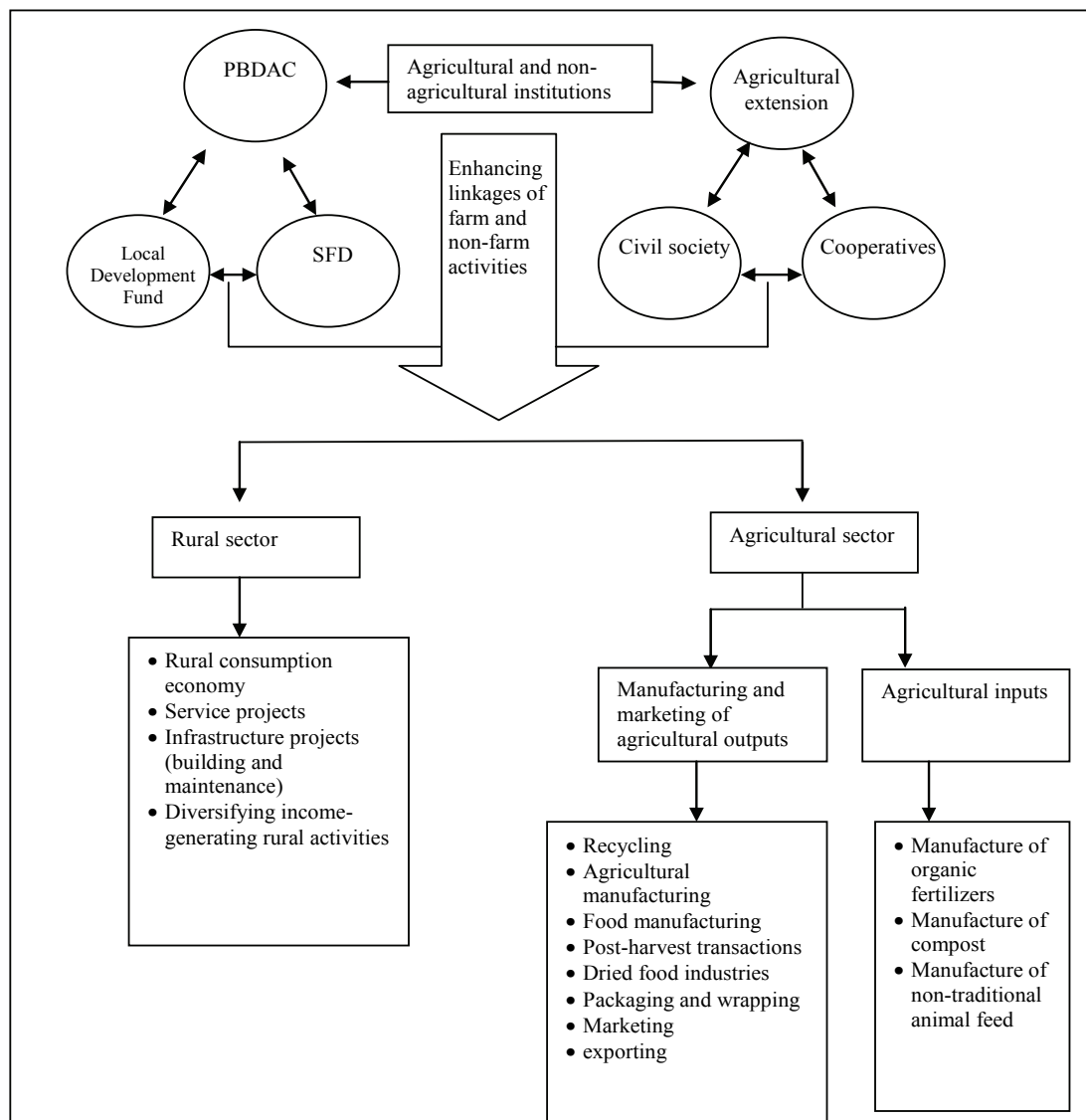
b. Specialization at the level of towns and villages:

Available resources and acquired experience allow specialization at the village level such as manufacture of thyme pastry, and medicinal and aromatic plants and dates and rugs industries in the towns of Snoras and Ibshway in Fayoum; extracting limestone, construction industries, and manufacture of fishing nets and equipment in Ibshway villages; and other heritage and handicraft industries (Michigan State University 1982).

Coordination between agricultural institutions in developing, improving, modernizing and expanding these projects may be undertaken through the agricultural extension system, the PBDAC, funds and civil society organizations active in this area.

6. CONCLUSION

This paper focuses on the interrelationships between the farm and the non-farm subsectors. After highlighting the potential types of the farm/non-farm linkages, the paper draws lessons from international experience with respect to the institutional, technological and organizational reforms needed to strengthen those linkages in order to promote rural development.

The analysis on Egypt reveals the importance of the farm sector and points to its forward production linkages with the rest of the economy, as well as to its high labor intensity. However, previous studies have proved that the employment elasticity to value added growth in agriculture is low. Therefore, the paper recommends the development of the non-farm sector in order to generate incomes and job opportunities, hence alleviating poverty in rural Egypt. This recommendation is supported by the actual importance of the non-farm sector to rural population in terms of employment generation and income diversification, as well as in terms of stimulation of production through consumption linkages.

With a view to promoting the non-farm sector and strengthening its potential linkages with the farm sector, together with agricultural growth, the paper

recommends increasing efforts on two fronts: *first*, reforming the institutions responsible for rural development and *second*, developing activities and projects that enhance farm/non-farm linkages.

Appendix (1)

Table A1.1. Updated Input-Output Table of Egypt for 2007/2008 (in Million LE)

	Agri-culture	Oil & extraction	Food industry	Textiles	Fertilizers	Other chemicals	Petroleum products	Other industries	Electricity	Const-ruction	Transport & comm-unications	Other services	Domestic intermediate output	Final demand	Gross output
Agriculture	11974	0	41475	554	54	550	0	375	0	0	291	5429	60702	81142	141844
Oil and extraction	0	6373	9209	257	1105	6529	22029	6428	7235	0	9364	24251	92781	65626	158407
Food industry	740	556	1600	19	36	365	1	503	0	0	7293	22179	33292	85937	119229
Textiles	267	153	88	6090	0	15	1	526	0	0	69	6494	13702	28046	41748
Fertilizers	2565	0	0	0	0	0	0	0	0	0	0	0	2565	561	3125
Other chemicals	614	318	23	1264	208	3432	27	3976	0	6890	45	3417	20213	34542	54755
Petroleum products	1188	735	3333	135	98	3177	78	5266	122	887	4375	1794	21186	14418	35604
Other industries	229	1239	231	293	120	1240	23	16500	16	25056	1783	3827	50556	147933	198489
Electricity	366	137	796	762	5	983	19	1984	1	446	200	2973	8672	15963	24635
Construction	38	180	37	23	30	310	2	1064	22	4600	599	1255	8161	83079	91240
Transport & communication	342	167	202	283	44	451	34	1272	5	804	2033	8141	13777	116031	129808
Other services	6517	4391	2365	10691	433	4744	3299	24566	235	197	5602	28755	91795	388163	479957
Domestic intermediate inputs	24839	14247	59359	20370	2132	21797	25514	62459	7636	38880	31653	108514	417401	1061443	1478844
Imported intermediate inputs	3509	2186	37222	10653	1772	7422	409	53505	2455	11499	4585	29725	164943	182957	347900
Total intermediate inputs	28348	16433	96582	31023	3904	29219	25923	115965	10092	50378	36237	138240	582344	1244400	1826744
Gross value added	113496	141975	22648	10726	2646	22112	9681	82525	14543	40862	93570	341718	896500		
Gross output	141844	158407	119229	41748	6550	51331	35604	198489	24635	91240	129808	479957	1478844		

Source: Authors' calculations based on the 2007/2008 Input-Output Table.

Table A1.2. Matrix of Technical Coefficients [A]

Sectors	Agri-culture	Oil & extraction	Food industry	Textiles	Ferti-lizers	Other chemicals	Petroleum products	Other industries	Elect-ricity	Const-ruction	Transport & communication	Other services
Agriculture	0.0844	0.0000	0.3479	0.0133	0.0082	0.0107	0.0000	0.0019	0.0000	0.0000	0.0022	0.0113
Oil and extraction	0.0000	0.0402	0.0772	0.0062	0.1688	0.1272	0.6187	0.0324	0.2937	0.0000	0.0721	0.0505
Food industry	0.0052	0.0035	0.0134	0.0005	0.0054	0.0071	0.0000	0.0025	0.0000	0.0000	0.0562	0.0462
Textiles	0.0019	0.0010	0.0007	0.1459	0.0000	0.0003	0.0000	0.0026	0.0000	0.0000	0.0005	0.0135
Fertilizers	0.0181	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other chemicals	0.0043	0.0020	0.0002	0.0303	0.0317	0.0669	0.0008	0.0200	0.0000	0.0755	0.0003	0.0071
Petroleum products	0.0084	0.0046	0.0280	0.0032	0.0149	0.0619	0.0022	0.0265	0.0049	0.0097	0.0337	0.0037
Other industries	0.0016	0.0078	0.0019	0.0070	0.0184	0.0242	0.0006	0.0831	0.0006	0.2746	0.0137	0.0080
Electricity	0.0026	0.0009	0.0067	0.0182	0.0007	0.0191	0.0005	0.0100	0.0000	0.0049	0.0015	0.0062
Construction	0.0003	0.0011	0.0003	0.0005	0.0046	0.0060	0.0001	0.0054	0.0009	0.0504	0.0046	0.0026
Transport & communication	0.0024	0.0011	0.0017	0.0068	0.0067	0.0088	0.0010	0.0064	0.0002	0.0088	0.0157	0.0170
Other services	0.0459	0.0277	0.0198	0.2561	0.0662	0.0924	0.0927	0.1238	0.0095	0.0022	0.0432	0.0599

Source: Authors' calculations based on the 2007/2008 Input-Output Table.

Table A1.3. Leontief Inverse [I – A]⁻¹ (Matrix of Direct and Indirect Requirements)

Sectors	Agriculture	Oil & extraction	Food industry	Textiles	Fertilizers	Other chemicals	Petroleum products	Other industries	Electricity	Construction	Transport & communication	Other services
Agriculture	1.0967	0.0026	0.3878	0.0284	0.0148	0.0201	0.0048	0.0088	0.0011	0.0045	0.0266	0.0336
Oil and extraction	0.0166	1.0491	0.1106	0.0473	0.2014	0.2045	0.6577	0.0752	0.3122	0.0475	0.1108	0.0717
Food industry	0.0090	0.0055	1.0187	0.0175	0.0112	0.0153	0.0084	0.0112	0.0022	0.0052	0.0613	0.0521
Textiles	0.0034	0.0018	0.0027	1.1762	0.0017	0.0028	0.0027	0.0060	0.0007	0.0020	0.0019	0.0173
Fertilizers	0.0198	0.0000	0.0070	0.0005	1.0003	0.0004	0.0001	0.0002	0.0000	0.0001	0.0005	0.0006
Other chemicals	0.0065	0.0029	0.0031	0.0414	0.0363	1.0747	0.0035	0.0257	0.0011	0.0930	0.0021	0.0097
Petroleum products	0.0107	0.0057	0.0331	0.0096	0.0199	0.0702	1.0066	0.0325	0.0068	0.0257	0.0378	0.0078
Other industries	0.0035	0.0098	0.0048	0.0143	0.0254	0.0338	0.0080	1.0957	0.0040	0.3199	0.0186	0.0118
Electricity	0.0035	0.0014	0.0084	0.0247	0.0026	0.0222	0.0021	0.0127	1.0005	0.0107	0.0028	0.0078
Construction	0.0007	0.0014	0.0008	0.0021	0.0057	0.0077	0.0013	0.0069	0.0014	1.0558	0.0054	0.0033
Transport & communication	0.0040	0.0018	0.0038	0.0145	0.0091	0.0124	0.0039	0.0103	0.0010	0.0135	1.0175	0.0191
Other services	0.0590	0.0339	0.0494	0.3314	0.0871	0.1260	0.1214	0.1551	0.0210	0.0592	0.0595	1.0776

Source: Authors' calculations based on the 2007/2008 Input-Output Table.

41

Appendix (2)

Table A2.1. Employment Status by Region in Rural Egypt, 2008-09

	Lower Egypt	Upper Egypt	All rural
Wage worker in agriculture	7.72	9.81	8.64
Self-employed in agriculture	22.64	25.65	24.00
Unpaid worker in agriculture	19.95	20.90	20.31
Wage worker not in agriculture	39.07	33.55	36.63
Self-employed not in agriculture	9.19	8.79	9.05
Unpaid worker not in agriculture	1.43	1.31	1.38
Total	100	100	100

Source: Authors' calculations based on CAPMAS (2008/2009).

Table A2.2. Employment Status by Expenditure Quintiles in Rural Egypt, 2008-09

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	All Rural
Wage worker in agriculture	17.26	10.63	8.42	6.03	3.63	8.64
Self-employed in agriculture	21.69	23.81	24.07	23.84	25.84	24.00
Unpaid worker in agriculture	20.75	22.93	22.70	20.41	15.72	20.31
Wage worker not in agriculture	31.20	33.61	36.13	38.85	41.23	36.62
Self-employed not in agriculture	7.55	7.69	7.74	9.29	12.09	9.04
Unpaid worker not in agriculture	1.55	1.32	0.94	1.58	1.49	1.38
Total	100	100	100	100	100	100

Source: Authors' calculations based on CAPMAS (2008/2009).

Table A2.3. Income Shares by Sources of Income and Expenditure Quintiles, 2008-09

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	All Rural
Income from wages	45.03	40.17	38.52	36.70	30.62	36.43
Income from agricultural wages	13.73	7.90	6.02	3.88	1.84	5.25
Income from non-agricultural wages	31.31	32.27	32.50	32.82	28.78	31.07
Income from farm self-employed activities	24.62	28.70	29.64	28.27	24.52	26.82
Income from non-farm self-employed activities	9.24	10.10	10.13	12.24	14.19	11.87
Income from financial assets	0.05	0.14	0.26	0.32	0.92	0.46
Income from real estate with imputed rent	0.53	0.90	1.15	1.50	4.28	2.19
Income from transfers	10.63	9.71	10.05	10.72	15.54	12.08
Total imputed rent for all household	9.89	10.29	10.25	10.25	9.94	10.11
Total household income with imputed rent	100	100	100	100	100	100

Source: Authors' calculations based on CAPMAS (2008/2009).

Table A2.4. Income Shares by Diversification of Income and Expenditure Quintiles, 2008-09

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	All Rural
Agriculture only	0.23	0.07	0.09	0.09	0.05	0.10
Non-agriculture only	0.61	1.09	1.69	2.11	1.75	1.45
Both agriculture and non agriculture	0.14	0.16	0.07	0.06	0.07	0.10
Agriculture and unearned income	33.17	29.55	28.14	23.30	21.57	27.15
Non-agriculture and unearned income	24.86	26.49	26.75	30.11	34.70	28.58
Both agriculture and non-agriculture and unearned income	37.91	40.31	40.52	40.88	34.03	38.73
Unearned income only	3.07	2.33	2.75	3.45	7.82	3.88
Total	100	100	100	100	100	100

Source: Authors' calculations based on CAPMAS (2008/2009).

Table A2.5. Shares of Diversified Income Categories by Household Expenditure Quintiles, 2008-09

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	All Rural
Agriculture only	44.44	13.33	16.30	17.04	8.89	100
Non-agriculture only	8.45	15.03	23.32	29.09	24.12	100
Both agriculture and non-agriculture	28.24	31.30	13.74	12.21	14.50	100
Agriculture and unearned income	24.44	21.77	20.73	17.17	15.90	100
Non-agriculture and unearned income	17.40	18.53	18.71	21.07	24.29	100
Both agriculture and non-agriculture and unearned income	19.58	20.82	20.92	21.11	17.58	100
Unearned income only	15.81	11.98	14.16	17.77	40.28	100

Source: Authors' calculations based on CAPMAS (2008/2009).

Table A2.6. Consumption Pattern by Expenditure Quintiles, 2008-09

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	All Rural
Food and beverages	53.35	52.53	51.81	50.37	45.30	49.59
Alcoholic drinks and smokes	3.08	2.95	3.00	2.96	2.39	2.79
Clothes, textiles and feet covers	6.60	6.64	6.40	6.40	5.93	6.30
Residence and its accessories	16.48	16.68	16.79	16.99	17.07	16.88
Furniture, house equipment and maintenance	3.24	3.17	3.17	3.25	3.78	3.40
Health care and services	3.89	4.37	4.66	5.26	7.87	5.74
Transportation	2.35	2.61	2.89	3.09	4.19	3.27
Telecommunications	1.25	1.52	1.77	2.02	2.42	1.95
Culture and entertainment	0.89	0.98	1.12	1.31	2.49	1.57
Education	1.52	1.84	1.95	2.11	2.27	2.03
Restaurants and hotels	4.50	4.05	3.88	3.69	3.48	3.79
Various services and commodities	2.84	2.67	2.57	2.54	2.82	2.69
Total consumption	100	100	100	100	100	100
Food consumption pattern						
Non-alcoholic beverages	2.91	2.84	2.78	2.80	2.95	2.86
Cereals and bread	20.03	19.62	19.37	18.59	16.68	18.49
Meat	26.18	25.32	24.63	24.71	25.42	25.18
Fish	4.18	5.11	5.69	6.17	6.44	5.76
Dairy, cheese and eggs	9.81	10.75	11.37	11.75	12.27	11.45
Oils and fats	9.88	9.43	9.19	8.87	8.80	9.12
Fruits	4.81	5.51	5.77	6.24	6.95	6.08
Vegetables	15.94	15.30	15.03	14.64	13.95	14.76
Sugar and sweet products	4.54	4.42	4.48	4.53	4.80	4.59
Other food products	1.72	1.71	1.70	1.71	1.73	1.71
Total Food Consumption	100	100	100	100	100	100

Source: Authors' calculations based on CAPMAS (2008/2009).

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