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The Cabinet
Information and Decision Support
Center

MEASURING THE IMPACT OF THE EGYPTIAN FISCAL STIMULUS PACKAGE 2008/2009

March 2010


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FOREWORD

The world economy has witnessed a period of declining rates of economic growth and employment starting in 2008 in the aftermath of the global financial crisis, which has been considered as the worst economic shock since the 1929 Great Depression. The crisis represented a serious challenge for decision makers in different countries who had to seek for effective policies to react to the global financial crisis and similar crises that have increasingly become more frequent and severe. Fiscal stimulus programs have been adopted by many developed and developing countries to minimize the negative impact of the Global Financial Crisis on growth and employment.

The Egyptian Government launched its first fiscal stimulus package in 2008/2009. The package aims at containing the possible adverse repercussions of the global financial crisis on the Egyptian economy, maintaining the sustainability of development programs through raising employment rates and reducing the threat of a decline in the rate of economic growth. In order to achieve these goals, the Egyptian Government has directed a considerable share of the fiscal stimulus package to public utilities infrastructure, particularly to water and sewage projects and to building roads, bridges, schools and basic health care centers.

In its capacity as a think tank and in view of its continuous pursuit to provide policy makers with advice on high priority issues, the Egyptian Cabinet Information and Decision Support Center (IDSC) in collaboration with International Labour Ogranization/ Sub-Regional Office for North Africa in Cairo have undertaken this study to examine the socioeconomic effects of the fiscal stimulus package 2008/2009 on the number of job vacancies, production and economic growth in the Egyptian economy. The results of the study should be of interest for policy makers seeking to monitor and evaluate the economic environments of the first stimulus package and for those concerned with the formulation and design of stimulus packages in the future.

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LIST OF ACRONYMS

AGA	Animal
AGV	Vegetarian
AMCHAM	American Chamber of Commerce in Egypt
BAM	Base Metals
BL	Backward Linkages
BLD	Building
BL_R	Rasmussen Backward Linkages
BL_W	Watanabe Backward Linkages
CAPMAS	Central Authority for Public Mobilization and Statistics
CBE	Central Bank of Egypt
CBSB	Construction and Building Statistical Bulletin
CHM	Chemical Industry
CLT	Clothing
DTFA	Department of Treasury and Finance of Australia
EGP	Egyptian Pound
EIP	Economic Issues Program
ELC	Electricity
ELS	Electricity Stations
empj	Vacancies Coefficient
empl	Employment Coefficient
empva	Value added Coefficient
ENM	Engineering and Machinery
FDT	Food and Tobacco
FL	Forward Linkages
FL_R	Rasmussen Forward Linkages
FL_W	Watanabe Forward Linkages
FSP	Fiscal Stimulus Package
FY	Fiscal Year
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GOE	Government of Egypt
IDSC	Information and Decision Support Center
ILO	International Labour Organization
IMF	International Monetary Fund
INP	Institute of National Planning
I-O	Input-Output
MET	Metal Industry
mj	Job Vacancies Multiplier
ml	Domestic Employment Multiplier
MOED	Ministry of Economic Development
MOF	Ministry of Finance

MOTI	Ministry of Trade and Industry
mva	Value Added Inducement Multiplier
NMI	Non-Metal Industry
OCB	Other Construction and Building
OECD	Organization for Economic Co-operation and Development
OEM	Oil and Mineral Extraction
OPS	Other Productive Services
OTI	Other Industry
PACG	Personnel Administration Consulting Group
PET	Petroleum Products
QIZ	Qualifying Industrial Zones
RBR	Roads and Bridges
SAM	Social Accounting Matrix
SOS	Social Services
SWV	Spinning and Weaving
TRC	Transport and Communications
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
USDTFHA	United States Department of Transportation Federal Highway Administration Office of Transportation Policy Studies
VA	Value Added
WAS	Water and Sewage
η_E	Elasticity of Export Supply
η_H	Elasticity of Household Demand for Capital Goods

Measuring the Impact of the Egyptian Fiscal Stimulus Package 2008/2009

1. INTRODUCTION

Since the onset of the recent Global Financial Crisis (GFC), a considerable number of governments in developing and developed countries have relaxed their fiscal policy measures and initiated stimulus plans to help contain the adverse effects of the crisis. The fiscal stimulus packages (FSPs) undertaken by different countries aimed at invigorating the economic growth momentum, supporting the labor market and creating employment opportunities (Katz and Suter 2009; Zandi 2008; Flaherty 2009; Angelov and Djankov 2009; OECD 2009; IMF 2009; Prasad and Sorkin 2009; Saha and Weizsäcker 2009; UNECLAC 2009; UNESCAP 2009; ILO 2009). Various stimulus plans have also attempted to provide social protection for the relief of those who were affected by the crisis.[1]

The structure, size and composition of the FSPs varied across countries. Based on a comparison of stimulus packages for 22 countries, Khatiwada (2009) has shown that while tax cuts accounted for over one third of the fiscal stimulus in advanced economies, they comprised only 3 percent of the targeted stimulus expenditure in developing and emerging economies. Furthermore, the proportion of the FSP spending committed to infrastructure development was three times higher in developing and emerging economies versus advanced economies. Social transfers to low-income households represented a relatively small proportion of the FSP in advanced and developing/ emerging economies (10.8 percent and 6.8 percent, respectively). According to Scott (2008), a discretionary stimulus package equivalent to 1 percent of a country's GDP could on average increase GDP by 12- percentage points.

In the wake of the GFC, the Government of Egypt (GOE) committed about EGP 15.53 billion in the FY 2008/09 to a set of rescue measures (FSP 2008/2009). The measures aimed at preserving and stimulating domestic demand, supporting the sectors affected by the crisis and accelerating the implementation of national projects seen as contributing to social welfare (e.g., water, sewage, ports, roads and bridges) through increasing investment in public utilities infrastructure (Ramadan 2009). It was also anticipated that the FSP 2008/2009 could be effective in raising employment opportunities to meet the GOE announced target of providing around 650,000 new jobs annually over the next few years (MOED 2009b) [2] .

The main objective of this study is to assess the short-run impact of the FSP 2008/2009. The effects of the package are gauged through measuring the potential changes in the number of job vacancies, production and economic growth generated by the fiscal impetus. The assessment is based on the actual distribution of the stimulus spending across sectors that was announced by the GOE. An input-output (I-O) model is used to track the sectoral impact of the stimulus expenditure (Crandall et al. 2007; Katz et al. 2008; Atkinson et al. 2009). The sectoral findings are articulated to derive the economy-wide effects of the package on the level of domestic employment and growth.

[1] Zhang et al. (2009) reviewed a collection of 49 fiscal stimulus packages worldwide to evaluate their social protection components.

[2] An employment target was incorporated into the stimulus objectives for a number of countries e.g., Chile 100 thousand, France 80 -110 thousand, Hungary 20 thousand, Indonesia 2.6 million, Spain 300 thousand and the United States 3.5 million (Khatiwada, 2009). The FSP 2008 /2009, however, does not explicitly include an employment target.

The rest of this study is organized as follows. The second section presents an overview of the structure and components of the FSP 2008/2009. A brief review of the I-O methodology used to examine the effects of the stimulus is offered in section 3. Section 4 studies and evaluates the impact of the package on employment and production at the sectoral and aggregate levels using a set of labor multipliers estimated from the Egypt I-O table for 2007/2008 (Egypt I-O 2007/2008). The implications of the stimulus package are analyzed in context of the relative importance of the different productive sectors in the Egyptian economy and the sectoral distribution of the FSP 2008/2009 outlays. The Egypt I-O 2007/2008 table constitutes the core database for this study. A description of the table and other subordinate data used in the computations is presented at the beginning of this section. Section 5 discusses some salient data deficiency problems encountered in the study and selected corrective measures that were implemented. Section 6 concludes. The appendix displays some additional quantitative results in a tabular format.

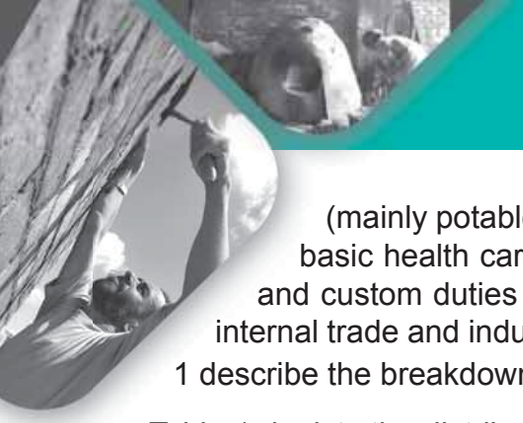
Box 1. Structural Breakdown of FSP 2008/2009 by Budget Sector.

Table A1 reveals that 45.3 percent of the FSP 2008/2009 expenditure (EGP 7.03 billion) went to potable water and sewage projects with a tad more than half of it (54.3 percent) committed to provide 240 villages and selected governorates with drinking water. The remaining water and sewage outlays were directed to extending sewage services for selected villages (EGP 0.77 billion) and governorates (EGP 2.44 billion). Other expenditure on infrastructure projects included EGP 1 billion to construct an elaborate network of roadways and bridges, another EGP 1 billion for development projects at the governorate level and EGP 0.55 billion to build basic healthcare centers and schools besides other building and construction activities (EGP 0.63 billion). Alternatively, 17.4 percent, 12.9 percent and 3.9 percent of the overall stimulus outlays were directed to subsidizing exports and supporting internal trade and industrial zones, lowering custom duties and sales tax on selected industrial inputs and capital goods and developing seaports and the Egyptian railways, respectively.

2. EGYPT FISCAL STIMULUS PACKAGE: AN OVERVIEW

The contagion of the GFC spread to Egypt through the international financial and commodity markets and institutional transmission mechanisms impacting economic growth and the labor market and raising fears of inflationary tension. To cope with the adverse implications of the crisis, the GOE launched its first stimulus package (FSP 2008/2009) in December 2008. The package was mainly designed to help circumvent possible unfavorable implications of the GFC on the Egyptian economy, to sustain the country's ongoing development program through raising the level of employment and to restrain the expected spurt of moderation in economic growth. The FSP 2008/2009 amounted to over EGP 15.53 billion equivalent to 1.5 percent of GDP (Ramadan 2009). The fiscal package was complemented by a precautionary monetary policy to motivate economic growth and maintain a comfortable level of foreign reserves and foreign exchange liquidity without exaggerating inflationary pressures. This study focuses only on measuring the partial equilibrium effects of the fiscal stimulus package. It overlooks the admittedly important implications associated with the interaction between monetary policy and fiscal spending on the pattern of incentives in the productive sphere, on the production possibilities available to the different sectors and on the competiveness of domestic producers in international markets.

The Egyptian stimulus package incorporated substantial spending on public utilities infrastructure



(mainly potable water and sewage projects and building roads, bridges, schools and basic health care centers). In addition, the package allocated payments for sales tax and custom duties reduction on some industrial inputs and capital goods for supporting internal trade and industrial zones and increasing export competitiveness. Table A1 and Box 1 describe the breakdown of the FSP 2008/2009 classified according to the budget sectors.

Table 1 depicts the distribution of the FSP 2008/2009 expenditures across different sectors. The table shows that 92.7 percent of the investment expenditure (EGP 10.05 billion) was allocated to just four sectors in construction and building (Building, Roads and Bridges, Water and Sewage and Other Construction and Building projects). An amount of EGP 7.03 billion was funneled to investment in Water and Sewage projects. The fiscal stimulus spending directed to the Building sector (EGP 0.42 billion) incorporated investment in school buildings, university hospitals and the restoration of mosques and Ministry of Justice buildings (tables 1 and A1). The Roads and Bridges sector received EGP 1 billion in addition to an extra EGP 1.40 billion for domestic development projects in various governorates and for improving the efficiency of the Egyptian railways. The Other Construction and Building sector stimulus included spending EGP 0.20 billion on the improvement of seaport infrastructure.

TABLE 1. FSP 2008/2009 SECTORAL EXPENDITURE ALLOCATION

(EGP Million)

Sectoral Distribution	Outlays
Investment Expenditure	10832
Building	420
Roads and Bridges	2400
Water and Sewage	7030
Construction and Building (other)	200
Productive Services (other)	182
Engineering and Machinery	600
Current Expenditure (Transfers/Subsidies)	2700
Increasing competitiveness of Egyptian exports (all sectors)	2100
Supporting industrial zones in Delta region (Agriculture: Vegetarian, Food and Tobacco, Spinning and Weaving and Other Industry)	400
Supporting logistic areas for internal trade (Social Services)	200
Customs Duties and Sales Tax	2000
Custom duties on selected industrial inputs and capital goods (All industry sectors except Oil & Mineral Extraction, Electricity, Construction and Other Industry)	1500
Temporary lift of sales tax on selected capital goods (Engineering & Machinery)	500
Total Expenditure	15532

Source: Computed from table A1.

The larger portion of the stimulus package current expenditure (EGP 2.1 billion) was devoted to enhance the competitiveness of Egyptian exports. In the absence of data on their actual distribution, it was postulated that those funds were allocated across sectors in proportion to their shares in Egyptian exports. Consequently, an additional EGP 26.8 million were allocated to the construction and building sector bringing up its overall share to 64.9 percent of the total fiscal stimulus.

Engineering and Machinery received a sizable part of the FSP 2008/2009 expenditure. Apart from its share in the funds disbursed for export promotion, the sector obtained EGP 0.60 billion for investment in basic health care centers and firefighting equipment and stations, as well as EGP 1 billion and EGP 0.50 billion in the form of custom duty reductions and temporary sales tax cuts on capital goods, respectively [3].

Tables 1 and A1 disclose that about EGP 0.38 billion were allocated to the Social and the Other Productive Services sectors for supporting internal trade logistics and developing goods and services outlets, respectively. Furthermore, EGP 0.40 billion of the FSP 2008/2009 was paid out to support industrial zones in the Delta region. It was assumed that most of that expenditure (88.8 percent) was directed at Spinning and Weaving. The residual EGP 0.05 billion was distributed between the Other Industry (7.5%), Food and Tobacco (2.5%) and Vegetarian (1.25%) sectors. The distribution was determined by the ratio of the number of companies in each sector to the total number of companies in the Delta region (box 2).

Box 2. Industrial Zones in the Delta Region.

Qualifying Industrial Zones (QIZ) are designated 15 industrial locations situated in several Egyptian governorates. The companies located within those zones are granted duty free access to the US markets conditional on compliance with a minimum agreed upon Israeli component in their products. The QIZ started operating in early 2005 in 7 industrial locations with 397 companies. By mid-November 2009, the number increased to 759 qualified companies. The majority of qualified companies (about 80 percent) are involved in textile and textile articles production. The rest operate in the fields of vegetable and animal production, prepared food stuff, plastic products, etc.

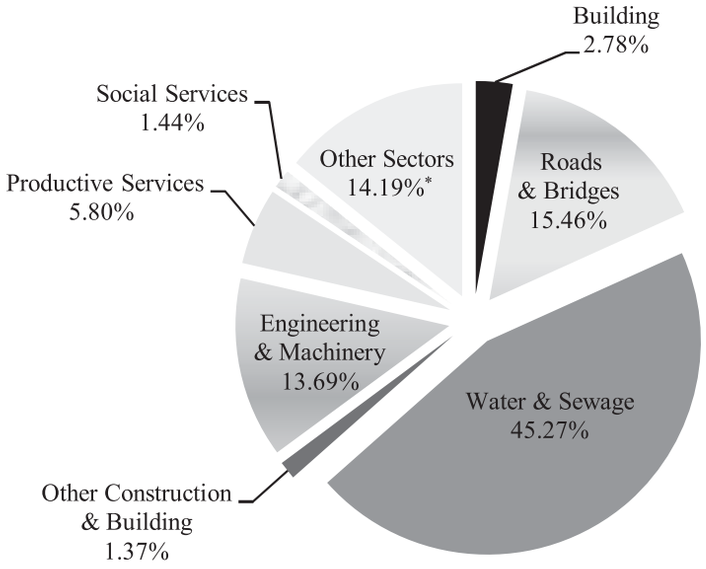
The qualifying zones in the central Delta region are located in four governorates: Gharbiya, Dakahliya, Monofiya, and Dammietta. Currently, the total number of qualified companies in the designated locations in that region reached 77 with 68, 2, 1 and 6 companies operating in the Spinning and Weaving, Food and Tobacco, Vegetarian and Other Industry sectors, respectively. Data on capital and investment for the qualified companies including those in the Delta region are not readily available.

Source: AMCHAM 2009 and MOTI 2009.

To sum up, the FSP 2008/2009 was distributed unevenly across sectors (figure 1 visually illustrates the decomposition of the stimulus expenditure). Most of the fiscal spending was targeted at the construction and building sectors (Water and Sewage, Roads and Bridges, Building and Other Construction and Building claimed about 65 percent of the total spending). Engineering and Machinery collected EGP 2.13 billion representing approximately 14 percent of the package. Finally, Other Productive Services and Social Services collected a smaller fraction (7 percent) of the total stimulus spending. Almost 80 percent of the fiscal funds for Other Productive Services were directed at increasing foreign trade competitiveness while 90 percent of the Social Services stimulus went to support internal trade logistics.

[3] It was stipulated that two thirds of the funds spent on custom duties reductions for capital goods were directed at Engineering and Machinery. The remaining EGP 0.50 billion were distributed across all the other industrial sectors save Oil and Mineral Extraction, Electricity, all the sectors included in construction and building and Other Industry.

FIGURE 1. FSP 2008/ 2009 SECTORAL EXPENDITURE ALLOCATION



* Includes the following sector contributions (percent): Vegetarian 0.17, Animal 0.00,Oil and Mineral Extraction 2.90, Food and Tobacco 2.04, Spinning and Weaving 2.57,Clothing 0.20, Chemical Industry 0.83, Petroleum Products 0.64, Non-Metal Industry 0.72, Base Metals 1.32, Metal Industry 0.11, Electricity 0.00, Electricity Stations 0.00,Other Industry 0.83 and Transport and Communication 1.86.

3. THE I-O MODEL: CONCEPTUAL UNDERPINNINGS

An I-O model has been adopted to appraise the impact of the FSP 2008/2009 expenditure on the Egyptian economy. Besides its advantages (including linearity and transparency), the I-O framework is capable of considering the successive rounds of effects induced by exogenous demand shocks on intermediate and primary factor requirements and intensities and on the aggregate level of economic activity. Hence, the I-O construct has been widely used as a powerful tool for policy analysis to predict the direct and indirect impact of government policy and exogenous shifts in final demand [4]. Various I-O models have been employed in a broad variety of studies investigating issues such as macroeconomic effects of fiscal and trade (foreign and domestic) policy, sources of supply-demand gaps, multi-sectoral production linkages and job creation generated from investment in infrastructure, e.g., highway construction, water and sewage, healthcare centers, and broadband networks (USDTFHA 1997; Crandall et al. 2003; Atkinson et al. 2009; DTFA 2009; Levine 2009; PACG 2009). The remainder of this section sketches the conceptual foundation of the standard I-O model used in this study.

[4] Despite its analytical advantages, the I-O analysis has its known limitations related to the use of the model. Some of the assumptions of the I-O model are quite strong, e.g. perfect substitution between domestic and foreign goods. The use of the most traditional I-O model makes the commodity-activity (domestic production) a diagonal, thus no by-products, secondary products, etc. can be considered. This assumption eliminates some of the realism of the production sphere within the I-O framework, thereby, blurring the commodity-activity identity. The commodity-activity dichotomy is maintained in the I-O model by imposing a combination of the technology and commodity homogeneity assumptions, which again are rather strong. The I-O model does not consider dynamics and accordingly presumes that all the adjustment is instantaneous. This assumption might not always be valid particularly in countries like Egypt where markets do not work that well. Moreover, the I-O analysis cannot account for the whole socioeconomic interactions among the different institutions (government, household, and enterprises) of an economy, including social transfers, which can be easily accommodated within the social accounting matrix (SAM) framework (that is also capable- like I-O- of separating the direct, indirect and induced effects). These problems can be circumvented by setting up the I-O in a SAM framework once the appropriate data are available.
Nevertheless, both I-O and SAM based models are demand driven and, therefore, silent on the supply-side matching of assumed demand increase. Consequently supply-side considerations (e.g., labor supply) would have to be resolved outside these models.

3.1 THE I-O FRAMEWORK

The I-O model provides a consistent set of accounting relationships that depict the inter-sectoral intermediate input flows and the distribution of sectoral production between the different components of final demand at a certain point of time. The model also describes the role of primary (nonproduced) factors involved in the production process for each sector. Consequently, additional sectoral labor or capital requirements that result from an increase in final demand expenditure can be calculated within the I-O model (Levine 2009). In addition, the I-O model portrays the indirect tax payments and the subsidies received by the producers in each sector. Imports can be treated in different ways within the I-O framework. One way is to view imports as an alternative source of supply of final and intermediate goods. Perfect substitutability between the domestic and foreign goods implies that the intermediate inputs and final demand flows incorporate imports (including duties). Instead, imports can be treated non-competitively, i.e., distinct from domestic production. In that case, they are classified in the I-O table as if they were primary inputs (Dervis et al. 1982). The simple static I-O framework used in this study presumes that all imports are non-competitive so that the intermediate requirements and final demand flows refer only to domestically produced goods.

The static I-O model supposes that the economy is divided into *n* sectors with the production of each sector *i* (x_i) given by

$$x_i = \sum_{j=1}^{n} a_{ij} x_j + f_i \qquad (1)$$

where $a_{ij} = \frac{x_{ij}}{x_j}$, *i,j* = 1,..,*n,* are the fixed input-output technical coefficients, x_{ij} is the flow of dometic intermediate goods from sector *i* to *j* and f_i is the domestic final demand for output from sector *i*. The set of technical relationships portrayed in equation (1) can be expressed as

$$X = AX + F \qquad (2)$$

where *X* is the *n*×1 column vector of sectoral production, A is the *n*×*n* matrix of fixed technical coefficients and *F* is the *n*×1 column vector of domestic final demand. Solving for *X* yields

$$X = (I - A)^{-1} F \qquad (3)$$

where *I* is the *n*×*n* identity matrix. The elements of matrix $(I - A)^{-1}$ indicate the direct and indirect impact of a unit change in final demand.

The technical coefficients matrix *A* is a subset of the augmented (closed input-output) technological matrix A_{aug}. The (*n*+1)×(*n*+1) matrix A_{aug} is constructed by appending *A* with one extra row and one extra column for the household sector

$$A_{aug} = \left[\begin{array}{ccc|c} & A_{n\times n} & & \begin{matrix} a_{1h} \\ a_{2h} \\ \vdots \\ a_{ih} \\ \vdots \\ a_{nh} \end{matrix} \\ \hline l_1 & \cdots\ l_j\ \cdots & l_n & l_h \end{array}\right]_{(n+1)\times(n+1)}$$

where $a_{1h},..,a_{nh}$ are the shares of consumer expenditure (net of imported goods) for each sector in total disposable income and $l_1,..,l_n,l_h$ are the labor coefficients for sectors $i = 1,..,n$ and the household sector defined as the ratios of labor to gross output for each sector.[5] The elements of A_{aug} represent the direct, indirect and induced (household) effects of a unit change in final demand. The induced impact accounts for the successive additional spending of a fraction of the change in household income (determined by the household marginal propensity to consume) that continues until the inducement effect dissipates (Mouhammed 2000).

3.2 COMPUTING EMPLOYMENT AND VALUE ADDED MULTIPLIERS

The total amount of labor $\tilde{L}$ needed by the economy to produce X is determined in the I-O model according to

$$\tilde{L} = LX = L(I - A_{aug})^{-1}F \qquad (4)$$

where L is the $(n+1)\times(n+1)$ diagonal matrix whose diagonal components are the elements of the $1\times(n+1)$ row vector of labor coefficients. The direct, indirect and induced input requirements are implied by the $(n+1)\times(n+1)$ matrix $R = (I - A_{aug})^{-1}$ (USDTFHA 2006).

$$R = (I - A_{aug})^{-1} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} & r_{1n+1} \\ r_{21} & r_{22} & \cdots & r_{2n} & r_{2n+1} \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nn} & r_{nn+1} \\ r_{n+11} & r_{n+12} & \cdots & r_{n+1n} & r_{n+1n+1} \end{bmatrix}. \qquad (5)$$

The *Type II* employment multipliers are obtained by applying the formula

[5] Incorporating the induced labor effect explicitly takes into account the impact of consumer purchases of goods and services on output by considering the households as a sector purchasing inputs of goods and services to produce labor services (USDTFHA 2006). Disposable income is assumed to measure the "output" for the household sector.

$$ml = lRl^{*} \qquad (6)$$

where ml is the row vector containing the *n+1 Type II* labor multipliers (ml_i) and l^{*} is a diagonal (n+1)×(n+1) matrix whose diagonal elements are the reciprocals of the elements of l. *Type I* employment multipliers are obtained analogously using the technological matrix *A* in lieu of A_{aug} [6]. The total change in employment across sectors ($\Delta\tilde{L}$) resulting from a change in the spending of sector *i* (ΔF_i) is computed as follows

$$\Delta\tilde{L} = lR\Delta F_i. \qquad (7)$$

The product lR measures the total change in the labor requirements for the economy arising from a unit change in the final demand of sector *i*. The matrix *R* permits the decomposition of the total employment impact into direct, indirect and induced effects. The direct effect for sector *i* is measured by the product $l_i r_{ii}$ where r_{ii} denotes the diagonal elements of *R*. The indirect employment effect for sector *i* is calculated as the sum $\sum_{\substack{j=1 \\ i\neq j}}^{n} l_j r_{ji}$ where r_{ji} are the off-diagonal elements of the i^{th} column of *R*. Finally, the inducedimpact is measured as $l_h r_{hi}$ for i = 1,..,n+1.

The employment multipliers show that if spending increases in sector *i* by ΔF_i then employment (labor income i.e., the wage bill) across sectors in the economy will change by $\Delta F_i \times empl_i$ where $empl_i = ml_i \times l_i$ is the total employment coefficient for sector *i*. Sectoral multipler for the number of new job vacancies in the economy (mj_i) are derived from the employment multipliers after deflating the labor coefficients *(li)* by the annual wage rate for the relevant sector[7]. The row coefficients of the matrix *R* together with the employment multipliers and coefficients determine the change in employment and in the number of jobs generated in each sector by the direct, indirect and induced labor effects resulting from changes in the final demand spending of the other sectors.

The I-O model equations (4), (6) and (7) can be replicated after replacing l with the vector of value added coefficients $va = [va_1 ... va_n va_h]$ whose elements va_i are defined as the ratios of the value added to the gross output for each sector. The sectoral value added inducement multipli-

[6] *Type I* employment multipliers measure employment changes for both directly and indirectly affected sectors. They are computed for each sector as the ratio of the change in direct employment plus change in indirect employment to the change in direct employment. *Type II* employment multipliers include the employment induced by spending in the local economy by workers involved in the directly and indirectly affected sectors. Accordingly, they are calculated as the ratio of the sum of the changes in direct, indirect, and induced employment to the change in direct employment.

[7] *Type II* employment coefficients estimate the number of direct, indirect and induced jobs created in the economy resulting from a unit change in final demand. The direct employment coefficient for sector *i* is the *i* [th] diagonal element of the product *lR*, which indicates the change in the number of job opportunities generated in sector *i* owing to a unit change in the sector's spending.

ers ($mlva_i$) and coefficients determine the direct, indirect and induced effects on the value added arising from an exogenous change in final demand expenditure (Mouha mmed 2000).

4. THE IMPACT OF THE FSP 2008/ 2009 ON DOMESTIC EMPLOYMENT AND GROWTH

The effects of the FSP 2008/2009 on domestic employment and growth are derived by solving the I-O model, using the most recent available set of I-O accounts (Egypt I-O 2007/2008) as a benchmark for calibration (IDSC 2009). The Egypt I-O 2007/2008 table provides a stylized description of the economy in 2007/2008. The main characteristics of the Egyptian economy depicted by the table are reviewed before presenting the solution results and policy findings.

4.1 DATA DESCRIPTION: THE I-O AND SUBORDINATE ACCOUNTS

Egypt I-O 2007/2008 is a national I-O table for Egypt. The fixed technical coefficients reported in the table were not quantified on the basis of recent surveys. Instead, they were updated by adjusting the official 2002/2003 I-O coefficients documented by the Ministry of Economic Development using historical data to represent a snapshot of the structure of the Egyptian economy in 2007/2008 (IDSC 2009)[8]. Since 2002/2003, successive rounds of adjustments were implemented to ensure the consistency and balance of the underlying I-O accounts with the values of the key and (purportedly) more statistically credible aggregate macroeconomic variables obtained from the official Five Year Plan and the subordinate Annual Plans (Aboul-Einein 2006). The aggregate balances for the I-O 2007/2008 update were constructed using the available official statistics on resource supply and uses of GDP for 2007/2008 and the national accounts statistics for 2006/2007, as well as the information in the 2007/2008 follow-up report (MOED 2008), the Monthly Statistical Bulletin (CBE 2009) and the GOE Budget 2007/2008 (MOF 2009).

The current I-O table was built around 22 sectors representing 2 agricultural, 17 industrial and 3 productive and social services sectors.[9] It has been tailored to include a detailed breakdown of the construction and building sectors (decomposed into Building, Roads and Bridges, Water and Sewage, Electricity and Other Construction and Building), in order to permit the assessment of the impact of the FSP 2008/2009 (CAPMAS 2007; see box 3).[10] It has also been constructed so as to account for the stimulus effects on domestic employment and economic activity by dichotomizing the matrices that identify domestic production and import interflows, thus separating the domestic from the imported components of intermediate inputs

[8] The 2002 /2003 technical coefficients are themselves based on the I-O table issued by CAPMAS (1996) for 1991/ 92.

[9] The sectors are *agriculture:* Vegetarian and Animal Production; *industry:* Oil and Mineral Extraction, Food and Tobacco, Spinning and Weaving, Clothing, Chemical Industry, Petroleum Products, Non-Metal Industry, Base Metals, Metal Industry, Engineering and Machinery, Electricity, Building, Roads and Bridges, Water and Sewage, Electricity Stations, Other Construction and Building and Other Industry; *services:* Transport and Communication, Other Productive Services and Social Services.

[10] The statistical data required for the decomposition of the construction and building sectors were obtained from the Construction and Building Statistical Bulletin, CBSB (CAPMAS 2007). It would have been more interesting to have a sectoral disaggregation with finer resolution. For instance, it would have been useful to provide a sectoral breakdown for roads into different types (national, rural, etc.), as their labor intensity is quite different and thus their impact on job creation (caused by variance in underlying technology choice). However, this was not possible owing to the lack of data.

and final demand.[11] The Egypt I-O 2007/2008 incorporates a standard representation of final demand (household consumption, government expenditure, private investment and exports) and value added accounts (primary inputs (labor and capital), indirect taxes, subsidies and import duties).[12]

The I-O accounts disclose that the total value added at market prices (GDP) was EGP 896.5 billion in 2007/2008. Indirect taxes reached EGP 42.7 billion. Only 2 sectors in the economy (Petroleum Products and Food and Tobacco) received subsidies amounting to a total of EGP 76.7 billion. The total bill for intermediate and final goods imports (including EGP 14.2 billion duties) was equal EGP 361.9 billion. Exports were valued at EGP 293.5 billion and the final demand components: private consumption, government spending and investment totaled EGP 557.9 billion, EGP 87.8 billion and EGP 122.1 billion, correspondingly, representing 62.2, 9.8 and 13.6 percent of GDP, respectively.

The last column in table A2 depicts the number of workers in the different sectors (MOED 2009c). The total number of workers in the economy amounted to 20.8 million employees. The ratio of labor value added to the number of workers provides a crude approximation of the average annual wage rate in each sector (table A2).[13]

Box 3. The Construction and Building Statistical Bulletin

The Construction and Building Statistical Bulletin (CBSB) is issued annually by CAPMAS. The bulletin aims at providing a detailed statistical database for the construction and building sector. The types of construction/building activities (projects) covered by the CBSB encompass housing, industry, education, health, government, banking sector, sports facilities and other building as well as roads, bridges, water, electricity and sewage stations/networks, water-well drilling, digging and water canals. The database includes information on the number of companies and workers operating in construction and building activities, the values of inputs, production and total value added and the movement of fixed assets. The information on inputs is available for both the major material inputs employed in the sector (reinforcing iron, cement, brick, sand, gravel, wood, tiles, sanitary appliances, hardware and electrical appliances) and for the non-material and operational inputs demanded for production (including maintenance and services, transportation and communication, and rental services). The information is also available for the activities carried out by the contractors during the year either under direct contract or subcontracting arrangements.

The CBSB survey questionnaire incorporates a number of detailed questions pertaining to the contractor and the project activities. The questions related to the contractor include: a. Address and economic activity, b. Number of employees and their remuneration during the year, c. Value of inventories and supplies during the year, d. Expenses and revenues including revenues from activities involving more than one project during the year, e. Number of machines and transport equipment for each contractor and f. Flow of fixed and owned assets for each contractor. The questions pertaining to the operations/activities of contractors relate to: a. Contracted and subcontracted operations executed during the year and b. Raw materials used for contracted and subcontracted operations. While the CBSB data for private sector companies are collected over the calendar year (January-December), the data for public sector companies are gathered for the fiscal year (July-June).

Source: Construction and Building Statistical Bulletin (CAPMAS 2007).

[11] In other words, all the foreign imports are treated as non-competitive.

[12] The capital and labor (value added) accounts are highly aggregative and do not include a detailed description of the primary factor incomes by type (e.g., land, capital depreciation, labor skill, etc.).

[13] It would have been beneficial for the analysis to have more than the average wage rate, e.g., wages for the working poor who earn significantly less than the average. This would help to understand whether the stimulus spending reaches the people who are most vulnerable and most need public support. This, however, was not possible because of the unavailability of suitable data.

4.2 EFFECTS OF FSP 2008/2009 ON DOMESTIC EMPLOYMENT AND GROWTH

The I-O solution (outlined in sections 3.1 and 3.2) predicts the employment, vacancies and value added inducement multipliers used to estimate the direct, indirect and induced effects of policy changes in final demand. This section begins with a review of the structural features of the different sectors in the economy, particularly those that benefited most from the fiscal expenditure. The analysis of those attributes is central for understanding the impact of the stimulus funding.

4.2.1 GENERAL CHARACTERISTICS AND LINKAGES BETWEEN SECTORS

Table A2 portrays a basic set of key sectoral indicators from the Egypt I-O 2007/2008 database. The allocation of the stimulus funds across sectors is portrayed in Figure 1. The diagram indicates that 7 sectors received more than 85.81 percent of the total FSP 2008/2009 expenditure. In particular, about three quarters of that spending was directed to only 3 sectors: Water and Sewage, Roads and Bridges and Engineering and Machinery, with the first two alone claiming over 60 percent of the total stimulus.

Water and Sewage and Roads and Bridges share several common structural properties. Both sectors feature low levels of capital and output per worker and output per unit of capital (table A2). The low level of labor productivity and capital intensity seem responsible for the small value added share of each of the two sectors in GDP. Despite these similarities, Water and Sewage offers higher wage rates, albeit below the national average, compared with the Roads and Bridges sector, which hires relatively more workers probably to accommodate a larger capital stock [14].

Alternatively, Building and Other Construction and Building exhibit relative high value added shares. The average product of labor in Building, however, is greater in comparison with Other Construction and Building because of the higher capital-labor ratio and lower capital productivity.

The Engineering and Machinery sector is the third largest recipient of stimulus funds. With a reasonable value added share and fairly high productivity of capital and labor, it is expected that the sector would be central to Egypt's strategy for accelerating the pace of growth and technological advancement.

The value added contribution of the Other Productive and the Social Services sectors exceeds that of most of the other sectors including Engineering and Machinery. Each of those sectors offers above average wage rates and employs a large number of workers. Still, the level of labor productivity and capital intensity differ between the two sectors with significantly higher levels for both indicators in the Other Productive Services relative to Social Services.

The Water and Sewage, Roads and Bridges, Engineering and Machinery and Other Productive Services sectors exhibit substantial levels of final investment demand, which constitute an important stimulus for augmenting growth beyond the pure contribution of capital formation. More-

[14] The Roads and Bridges sector is marked by an exceptionally (and possibly unrealistic) low wage rate (table A2). In fact, all the construction and building sectors offer wages that fall well below the national average (the weighted average annual wage rate for all sectors is about EGP 19.01 thousand; yet that average declines to EGP 14.98 thousand when the Chemical Industry and Petroleum Products sectors are excluded). Furthermore, it appears that the official wage rate statistics for all sectors tend to underestimate the actual wages (at least in view of the current rates of economic growth in Egypt and the contribution of labor value added to growth), which implies higher aggregate levels of employment and lower unemployment rates.

over, none of the construction and building sectors output is consumed by the households sector. Table A2 discloses that consumer demand per unit of output for those sectors is equal to zero. This is further inferred from their weak Watanabe (FL_W) and Rasmussen (FL_R) forward linkages.[15]

Figure 2 depicts a graphical illustration of the normalized Watanabe and Rasmussen forward and backward intersectoral linkages reported in table 2A (see box 4).[16] All the construction and building sectors and Engineering and Machinery have weak forward linkages, thus emphasizing their strong sectoral independence. Poor backward linkages are observed for Water and Sewage and Engineering and Machinery, as opposed to Building, Roads and Bridges and Other Construction and Building sectors that exhibit strong backward linkages.

Box 4. Normalized Backward and Forward Linkages

To allow for comparability between sectors, the forward and backward linkages (FL and BL, respectively) are normalized to have the mean for each equal unity. Four classes of sectors are identified according to the normalized linkages:

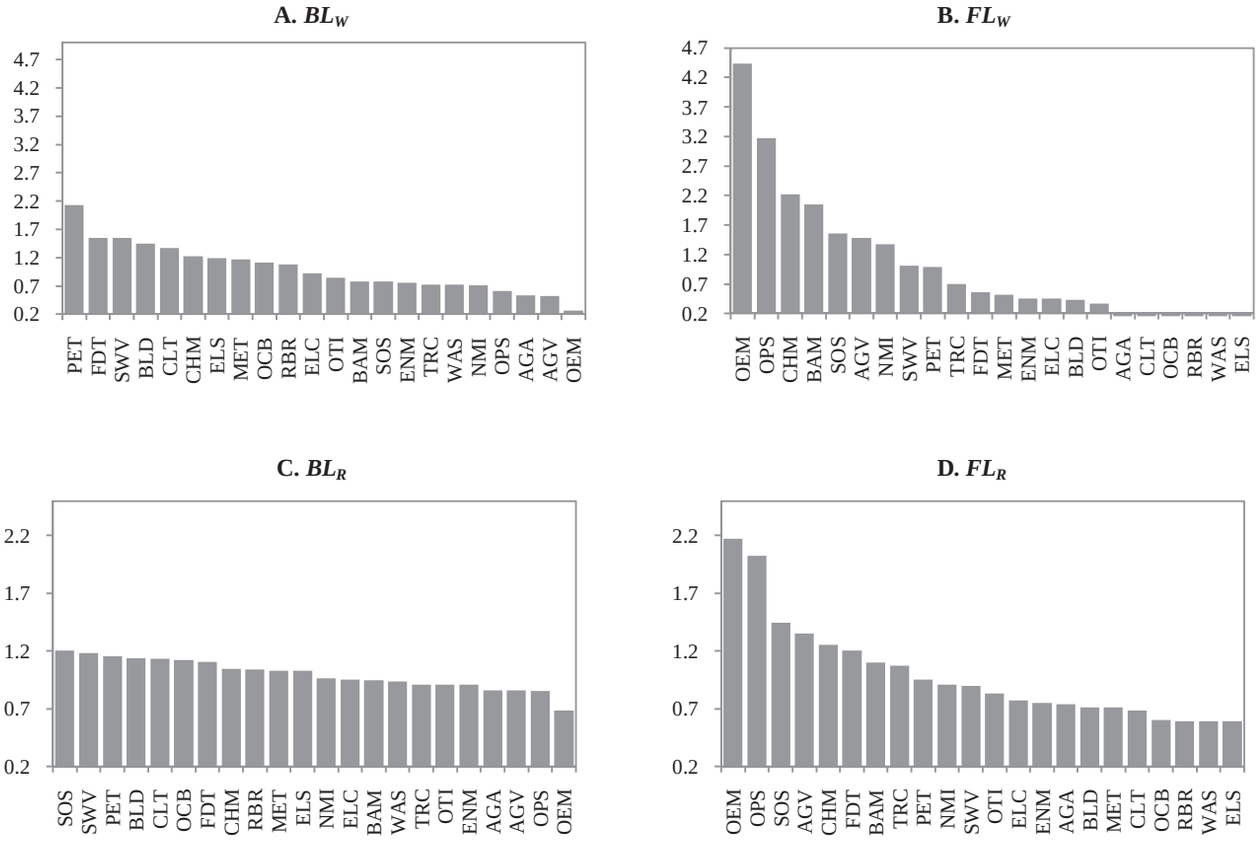
a. Key sectors exhibiting strong FL and BL (both FL/BL greater than 1)
b. Sectors exhibiting strong FL and weak BL (FL greater/BL less than 1)
c. Sectors exhibiting weak FL and strong BL (FL less/BL greater than 1)
d. Sectors exhibiting weak FL and BL (both FL/BL less than 1).

Source: Cail and Leung (2002).

[15] Linkages provide an estimate of the potential increase in the output level due to an increase in the final demand. Buying (selling) products from (to) other sectors denotes backward (forward) linkages (Kula 2008).

[16] With the exception of Social Services, the normalized Watanabe and Rasmussen indicators yield consistent results regarding the strength/weakness of linkages for the sectors entitled to the largest portion of the stimulus expenditure.

FIGURE 2. FORWARD AND BACKWARD LINKAGES (NORMALIZED)



Note: AGV=Vegetarian, AGA=Animal, OEM=Oil and Mineral Extraction, FDT=Food and Tobacco, SWV=Spinning and Weaving, CLT=Clothing, CHM=Chemical Industry, PET=Petroleum Products, NMI=Non-Metal Industry, BAM=Base Metals, MET=Metal Industry, ENM=Engineering and Machinery, ELC=Electricity, BLD=Building, RBR=Roads and Bridges, WAS=Water and Sewage, ELS=Electricity Stations, OCB=Other Construction and Building, OTI=Other Industry, TRC=Transport and Communications, OPS=Other Productive Services, SOS=Social Services.

The above findings suggest that only Water and Sewage and Engineering and Machinery fail to exhibit strong forward and backward linkages (class d in box 4). The Building, Roads and Bridges and Other Construction and Building have strong backward but weak forward linkages (class c). While Social Services appears to have strong forward linkages, Other Productive Services exhibits extensive backward and forward linkages. The leading role of Social Services and the strong backward linkages observed for Building, Roads and Bridges and Other Construction and Building should enable those sectors to become essential drivers of growth in Egypt.

A few sectors that received a large share of the stimulus lack sufficiently strong intersectoral linkages. The weak backward linkages for sectors like Water and Sewage and Engineering and Machinery curtail their capacity to encourage sufficient capital formation. From a social development perspective, adding to capital formation might not always represent an overwhelming feat for sectors with high social value, e.g., Water and Sewage. The capital augmentation requirement, however, would seem dire for prolific sectors like Engineering and Machinery that are apt to play a key role in the economy's technological transformation. Three of the construction

and building sectors, Building, Roads and Bridges and Other Construction and Building, display strong backward and weak forward linkages (class c, box 4). The weak forward linkages can largely be explained by the kind of output those sectors produce. Meanwhile, the extensive backward linkages reveal their importance in stimulating activity throughout the economy, due to high demand for output from the other sectors.

To sum up, the basic sectoral indicators that appear in table A2 show considerable diversity in the structural features and production linkages between sectors in the Egyptian economy. The variance extends across sectors that received a large part of the stimulus. With this diversity, the allocation of fiscal stimulus spending at different sectors is bound to affect the employment and economic growth outcomes of the package.

4.2.2 Employment, Job Vacancies and Income Inducement Multipliers Estimates

The *Type II* domestic employment,[17] job vacancies and value added inducement multipliers (*ml*, *mj* and *mva*, respectively) are estimated for each sector (table 2).[18] The corresponding total and direct employment, vacancies and value added coefficients (*empl, empj* and *empva*) are also portrayed in the table.[19] Table A3 displays the analogous *Type I* multipliers and coefficients for purpose of comparison.

Since a substantial fraction of the Egyptian population is poor with high marginal propensities to consume, modeling household effects amplifies the multiplier estimates. Tables 2 and A3 show that the *Type II* multipliers consistently exceed the comparable *Type I* estimates. The tables disclose that the average employment multiplier increases by 26.47 percent (from 1.73 to 2.18) when the household effects are considered. The largest variation is observed for the Social Services and Vegetarian multipliers. This is not surprising as both sectors are by far the largest employers accounting for more than 53.65 percent of the total number of workers in the economy (table A2). Similarly, the average vacancies and value added multipliers are enlarged 39.52 percent and 22.88 percent, respectively, after accounting for the induced effects. The largest variation for the *mj* multiplier is detected for the Base Metal, Chemical Industry, Petroleum Products, Non-Metal and Oil and Mineral Extraction sectors that have the highest annual wages in the economy. Naturally, the smallest change in the vacancies multiplier is recorded for Roads and Bridges in which the workers are paid staggering low wages compared to other sectors in the economy (table A2). The difference in the magnitude of the value added inducement multipliers with and without the induced effect is explained partly by the level of capital productivity and intensity. With their excessively low capital labor ratio and relative high capital productivity, Social Services and Other

[17] The study adopts the CAPMAS definition of employment that is also consistent with the Egyptian National Accounts definition according the Prime Minister decree number 983 for the year 2003. Hence, employment in this study refers to individuals, 15 years or older, working full-time or in a part-time job (at least one hour during the survey period) associated with one of the sectors in the economy. The data availability limitations preclude the possibility of measuring the number of jobs in terms of homogenous full-time employment equivalent units. Mixing up different forms of employment can lead to misleading results, especially when underemployment is high as in the case of Egypt. This problem can be aggravated within the I-O framework, which assumes homogenous labor force with equal participation in production to capture the employment creation impacts.

[18] The multipliers are estimated with the augmented Egypt I-O 2007/2008 technological coefficients matrix. Disposable income, which amounted to EGP 807.60 billion in 2007/2008 (MOED 2008) measures the virtual output for the household sector. The labor and capital for the household sector is calculated residually from the household row and column vectors in the augmented matrix as a function of the economy-wide capital labor ratio and household disposable income.

[19] The coefficients are derived as the ratios of the multipliers to the number of workers across sectors.

Construction and Building demonstrate the largest difference. Conversely, Oil and Mineral Extraction, Petroleum Products and, to a lesser extent, Other Productive Services are the least affected by the household sector augmentation owing to significantly higher capital intensity (table A2). The following analysis is based on the *Type II* multiplier estimates in order to take into account the effects of household demand behavior on economic activity.

Table 2 displays the multiplier and employment coefficients for the different sectors. The mean values for *ml*, *mj* and *mva* (2.18, 2.49 and 2.22, respectively) provide a rough estimate of the aggregate employment, vacancies and value added inducement multipliers for the economy. The average domestic total employment, vacancies and value added inducement coefficients, 0.24, 0.03 and 1.01, respectively, measure the effect of a unit increase in final demand.[20] A one unit increase in final demand equally distributed across sectors as such results in 0.24, 0.03, and 1.01 rise in labor income, job vacancies and value added.

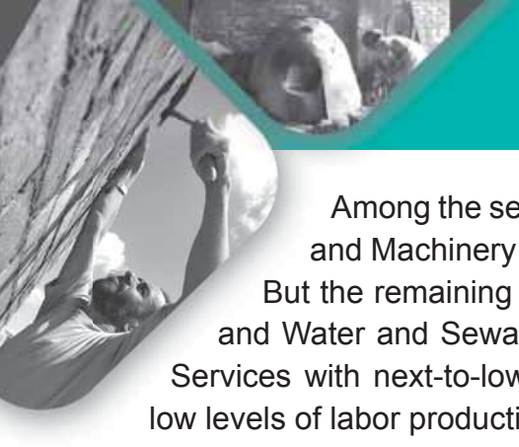
[20] The value added inducement coefficient is defined as the size of value added generated (owing to the direct, indirect, and induced effects) in all sectors resulting from a one unit change in final demand in a given sector.

TABLE 2. TYPE II MULTIPLIERS AND COEFFICIENTS

Sector	Employment			Vacancies			Value Added Inducement		
	ml	*empl*		*mj*	*empj*		*mva*	*empva*	
		Total	Direct		Total	Direct		Total	Direct
Agriculture									
Vegetarian	1.517	0.229	0.167	1.222	0.048	0.043	1.418	1.129	0.882
Animal	1.518	0.234	0.156	1.254	0.050	0.040	1.414	1.151	0.823
Industry									
Oil & Mineral Extract.	2.058	0.038	0.019	3.024	0.002	0.001	1.123	1.006	0.942
Food and Tobacco	2.690	0.199	0.077	5.510	0.022	0.004	4.597	0.796	0.181
Spinning & Weaving	3.206	0.249	0.092	1.529	0.057	0.045	2.901	0.969	0.398
Clothing	6.019	0.252	0.042	3.068	0.032	0.010	4.102	0.781	0.192
Chemical Industry	1.906	0.213	0.121	10.331	0.008	0.001	2.256	0.965	0.462
Petroleum Products	1.768	0.142	0.081	4.848	0.006	0.001	3.944	1.072	0.274
Non-Metal Industry	1.429	0.301	0.212	1.825	0.016	0.009	1.606	1.192	0.746
Base Metals	1.530	0.277	0.189	3.238	0.011	0.003	1.749	1.053	0.630
Metal Industry	2.358	0.213	0.091	1.469	0.026	0.018	2.188	0.924	0.424
Eng. & Machinery	2.003	0.197	0.100	1.894	0.016	0.009	1.959	0.748	0.388
Electricity	1.335	0.277	0.208	1.488	0.018	0.012	1.869	1.103	0.594
Building	2.939	0.219	0.082	1.629	0.024	0.017	2.401	1.006	0.464
Roads and Bridges	1.946	0.260	0.133	1.085	0.100	0.092	1.957	1.048	0.536
Water and Sewage	1.651	0.243	0.147	1.210	0.043	0.036	1.547	1.084	0.701
Electricity Stations	3.002	0.157	0.052	1.350	0.023	0.017	2.012	0.902	0.448
Other Constr. & Bldg	1.666	0.388	0.233	1.612	0.027	0.017	2.310	1.065	0.461
Other Industry	2.910	0.147	0.052	2.182	0.014	0.007	2.499	0.588	0.242
Services									
Transprt & Comm.	1.586	0.206	0.135	1.819	0.015	0.008	1.509	1.088	0.748
Other Prod. Services	1.597	0.173	0.117	1.693	0.015	0.009	1.418	1.023	0.778
Social Services	1.407	0.723	0.601	1.526	0.056	0.043	2.114	1.475	0.815

Source: Computed from Egypt I-O 2007/2008 (IDSC 2009).

The employment multipliers vary considerably across sectors ranging from 6.02 for Clothing to 1.34 for Electricity. The Clothing, Spinning and Weaving, Electricity Stations and Building sectors have considerable *ml* multipliers and thus are capable of generating significant employment in the economy for every unit increase in final demand for their output. The high employment generating sectors exhibit relatively high levels of labor productivity and strong backward relations (table A2).



Among the sectors that received a large share of the stimulus spending, Engineering and Machinery and Roads and Bridges exhibit relatively high employment multipliers. But the remaining sectors in construction and building (Other Construction and Building and Water and Sewage) and in services (Other Productive Services and of course Social Services with next-to-lowest employment coefficient estimate) tend to demonstrate relatively low levels of labor productivity and poor capacity for job creation (table 2).

The total employment coefficients (*empl*) presented in table 2 are obtained as the product of *ml* times the labor coefficient for each sector. The direct *empl* effect is decomposed from the employment coefficient with the diagonal elements of the matrix *R*. This determines the labor income generated in each sector by a unit change in its own final demand expenditure. The total employment coefficients echo the previous findings underscored by the multiplier estimates. Sectors with low output per worker, e.g., Social Services, Other Construction and Building as well as Electricity, Roads and Bridges and Water and Sewage exhibit higher total employment coefficients. Conversely, sectors like Oil and Mineral Extraction and Electricity Stations with low total employment coefficients demonstrate high levels of labor productivity.

Table 2 reveals that, probably with the exception of Clothing, the capacity of a given sector to induce employment in other sectors in the economy is generally low. This is reflected through the congruent matching of sectors featuring higher total employment coefficients and large direct employment effects.

The estimated multipliers for the number of job vacancies in the economy (*mj*), listed in table 2, also differ considerably across sectors ranging between 10.33 for Chemical Industry and 1.09 for Roads and Bridges. The variance primarily depends on the average annual sectoral wage rate. Tables 2 and A2 show that the Chemical Industry, Petroleum Products, Base Metals and Food and Tobacco, which have the highest wages, are virtually the same sectors with the highest vacancies multipliers rank. The exact opposite holds true for Roads and Bridges, Water and Sewage, Vegetarian, Animal Production and Electricity Stations. Like the employment coefficients, the relative ordering of the sectors according to size of total vacancies coefficients is more rather than less inversely related with the sector ranking on the basis of the *mj* estimates. The sectors that are relatively more capable of creating more new jobs seem to be less capable of inducing vacancies in other sectors in the economy.

The value added inducement multipliers (*mva*) portrayed in table 2 range from 4.60 for Food and Tobacco to 1.12 for Oil and Mineral Extraction. It is noticed that the sectors with small value added contributions (e.g., Oil and Mineral Extraction, Other Productive Services, Vegetarian and Transport and Communication) exhibit low levels of capital productivity and poor backward linkages.[21] In contrast, the sectors with strong backward linkages and generally sizable labor and capital productivity coefficients boast the highest value added inducement per unit of final output (e.g., Food and Tobacco, Clothing, Petroleum Products, Spinning and Weaving and Building). The large *mva* estimates for Food and Tobacco and Petroleum Products are boosted by the consumer subsidies offered to producers in those sectors.[22] In addition, table 2 reveals that the sectors with the highest *mva* ranking have the smallest direct value added inducement coefficients and vice versa. Sectors like Oil and Mineral Extraction and Other Productive Services have extensive forward link-

[21] This implies that the direct effect would have a bigger weight in the total value added inducement coefficient for those sectors.

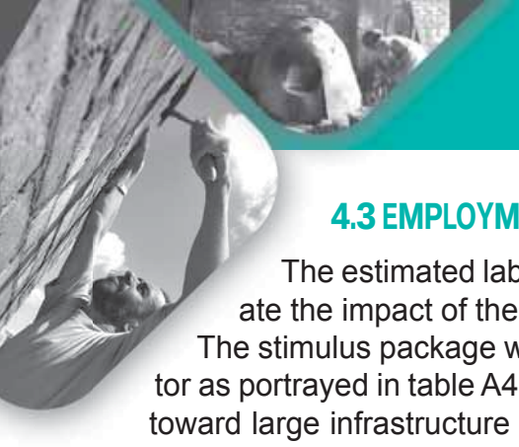
[22] Consumer subsidies for Food and Tobacco and Petroleum Products represent around 65.57 percent and 622.36 percent of the total value added of each sector, respectively. The Egypt I-O 2007/ 2008 data indicate that Food and Tobacco and Petroleum Products are the only sectors that received government subsidies.

ages and a large share of value added in GDP. The large shares allow for high levels of direct value added inducement benefits in those sectors, which are further magnified by low backward linkages. In turn, the small backward linkages lessen the indirect and induced value added effects as reflected by the lower total value added inducement coefficients. The converse applies to sectors like Clothing and Petroleum Products that possess high value added multipliers and low direct value added inducement per unit of final demand.

To sum up, several conclusions are discernible from the empirical findings. First, the multiplier estimates for all sectors exceed unity.[23] The result confirms the viability of the investment climate in Egypt as none of the productive sectors stands to earn a negative return on its investment. Second, the multiplier estimates differ significantly across sectors. This renders the sectoral distribution of the fiscal spending a pivotal parameter in the formula for determining the economy-wide impact of the FSP 2008/2009.[24] Third, the larger proportion of the stimulus was poured into 7 sectors, each having its own structural attributes. The structural diversity is reflected through the multiplier and labor coefficient estimates. While Social Services, Other Construction and Building and Roads and Bridges exhibit large total *empl, empj* and *empva* estimates, comparable coefficients for Water and Sewage, Building, Engineering and Machinery and Other Productive Services appear rather modest. Increased demand in Social Services has a prominent total impact on labor income, job creation and value added inducement coefficients. The Roads and Bridges sector is ranked first when it comes to the potentials for job creation. Engineering and Machinery, however, exhibits a low total value added inducement coefficient. On the other hand, with the exception of Building that ranks fourth in terms of labor income generation potentials, all the employment, number of jobs and value added inducement multipliers for those 7 sectors seem quite low. In particular, Water and Sewage and Other Productive Services display appreciably small *mj* and *mva* estimates, respectively. Finally, there are ostensibly many political economy considerations that influence the planner's choice regarding the allocation of stimulus funds towards sectors. For instance, fiscal funds can be targeted at sectors that are prospectively vital for socioeconomic progress, despite their modest value added inducement potentials. The funds can be directed to sectors with weak linkages to accelerate their technological transformation and raise their contribution to growth. Furthermore, sectors with broad backward linkages could be entitled to stimulus when confronted with financial constraints that jeopardize their intersectoral contribution to growth. Despite their importance, the complexity of those considerations together with limitation on the availability of suitable data precluded incorporation of various socioeconomic dimensions in the analysis of the stimulus effects.

[23] This might occur, for instance, because of leakages induced through the import of intermediate inputs (He et al. 2009).

[24] Since the GOE has actually disbursed the stimulus funds across the sectors, it would seem reasonable at the present time to confine the analysis to ex post appraisal of the impact of the existing distribution on employment and income generation rather than to search for an optimal design for the stimulus allocation.



4.3 EMPLOYMENT AND GROWTH IMPACT OF THE STIMULUS

The estimated labor and value added multipliers and coefficients were employed to evaluate the impact of the FSP 2008/2009 on domestic employment, vacancies and GDP growth. The stimulus package was transformed into a change in the value of final demand for each sector as portrayed in table A4. The table emphasizes how the stimulus package was weighted heavily toward large infrastructure expenditure. Besides, approximately 16.74 percent of the fiscal spending was allocated for increasing the competitiveness of Egyptian exports (EGP 2.1 billion) and for temporary sales tax reduction on selected capital goods (EGP 0.5 billion).

TABLE 3A. JOB CREATION WITH ALTERNATIVE ASSUMPTIONS ABOUT EXPORT SUPPLY AND HOUSEHOLD DEMAND ELASTICITIES

	Unitary Elasticity		Low Elasticity		Moderate Elasticity		High Elasticity	
Sectors	$\eta_E=\eta_H=1$		$\eta_E=1$; $\eta_H=0.5$		$\eta_E=2$; $\eta_H=1$		$\eta_E=3$; $\eta_H=2$	
	Created	Sectoral	Created	Sectoral	Created	Sectoral.	Created	Sectoral
Agriculture								
Vegetarian	1.280	24.977	1.280	24.696	2.323	30.145	3.366	35.875
Animal	0.012	6.139	0.012	6.063	0.023	7.075	0.035	8.164
Industry								
Oil & Mineral Extract.	1.041	1.096	1.041	1.089	2.083	1.611	3.124	2.142
Food and Tobacco	7.129	4.041	7.129	4.004	10.122	5.123	13.114	6.280
Spinning & Weaving	22.908	21.202	22.908	21.149	24.092	22.501	25.276	23.907
Clothing	0.991	1.373	0.991	1.358	1.121	1.526	1.251	1.708
Chemical Industry	1.081	0.839	1.081	0.833	1.576	0.916	2.072	1.004
Petroleum Products	0.596	0.547	0.596	0.543	0.938	0.674	1.279	0.811
Non-Metal Industry	1.809	7.086	1.809	7.078	3.086	7.852	4.363	8.634
Base Metals	2.201	3.490	2.201	3.457	3.731	4.043	5.261	4.663
Metal Industry	0.446	11.556	0.446	11.514	0.705	11.796	0.963	12.121
Eng. & Machinery	34.441	20.331	30.392	18.158	34.873	20.684	43.403	25.385
Electricity	0.005	2.171	0.005	2.120	0.010	2.399	0.014	2.729
Building	10.552	7.964	10.552	7.948	10.837	8.273	11.122	8.615
Roads and Bridges	240.878	222.042	240.878	222.042	240.943	222.102	241.008	222.162
Water and Sewage	302.811	250.230	302.811	250.230	302.845	250.258	302.879	250.286
Electricity Stations	0.003	0.002	0.003	0.002	0.006	0.004	0.008	0.006
Other Constr. & Bldg	5.692	3.621	5.692	3.621	6.052	3.848	6.413	4.076
Other Industry	1.785	2.599	1.785	2.558	2.311	3.028	2.837	3.540
Services								
Transprt & Comm.	4.187	7.755	4.187	7.686	8.373	10.569	12.560	13.521
Other Prod. Services	13.215	19.707	13.215	19.392	23.760	27.465	34.305	35.853
Social Services	12.404	37.380	12.404	36.687	13.701	41.379	14.997	46.763
Household	0.000	9.319	0.000	9.193	0.000	10.238	0.000	11.409
Change in Vacancies	665.468		661.419		693.512		729.653	
Vacancies Coef.	0.04		0.04		0.04		0.04	
Rate of Change (%)	3.20		3.18		3.33		3.51	

Notes:

[1] Export Elasticity (η_E) is the percentage change in the supply of exports owing to one percentage change in the domestic price of exports; household demand elasticity (η_H) is the percentage change in household demand owing to one percentage change in consumer prices. Number of jobs created is in thousand.

Source: Computed from Egypt I-O 2007/2008 (IDSC 2009).

It was assumed that the funds for raising export competitiveness were divided across sectors in proportion to their share in total exports. The corresponding percentage change in the final sectoral demand, instigated by that stimulus, depends on the values of the elasticity of export supply (η_E) for each sector. Because export elasticities estimates were not readily available, specific values were arbitrarily assumed. To avoid unwarranted bias, the elasticities were set equal for all sectors. Three values were chosen subjectively, corresponding to low (1), moderate (2) and high (3) elasticity. Again, it was assumed that the entire stimulus spending for sales tax reduction on capital goods was directed to Engineering and Machinery. The resulting increase in final demand was computed assuming low (0.5), moderate (1) and high (2) values for the elasticity of household demand for capital goods (η_H). Once more, the elasticities were held constant across sectors.

Four different alternatives were, therefore, considered to identify cases of unitary, low, moderate and high elasticity response by assuming the (η_E,η_H) combinations (1, 1), (1, 0.5), (2, 1) and (3, 2), respectively. The final demand vectors incorporating the alternative elasticity assumptions are illustrated in table A4. The change in the number of job vacancies and value added inducement simulated by the increase in final demand are shown in tables 3a and b, respectively.

The second column in table A4 shows the pattern of increase in final demand projected by the stimulus spending with the underlying unitary elasticity assumption. The Water and Sewage, Roads and Bridges and Engineering and Machinery sectors embodied the highest increase in final demand followed by Productive Services and Oil and Mineral Extraction. The corresponding increase in the overall number of (direct, indirect and induced) jobs created by each sector is presented in column 2 of table 3a. The third column in table 3a shows the sum of the direct number of vacancies generated in a given sector, plus the total number of jobs created in that sector via the cumulative indirect and induced effects arising from the increase in the final demand of each of the other sectors. Thus, the discrepancy between the elements of columns 2 and 3 in table 3a measures the difference between the sum of the indirect and induced job opportunities created by a given sector less the total number of vacancies created by the indirect and induced effects of all the other sectors generated in the given sector. A positive (negative) difference signifies that a given sector enjoys greater (less) potential to create vacancies in the other sectors than all the other sectors combined possess to create vacancies in the given sector.

The value added inducement effects of the stimulus appearing in table 3b are arranged similar to the arrangement of the job creation estimates displayed in table 3a. Stipulating unitary elasticity, the estimates in table 3b disclose that the value added in Social Services, Non-Metal Industry, Animal and Vegetarian would rise by approximately EGP 1475, 1192, 1149 and 1129, respectively, for every EGP 1000 increase in the final demand of each sector. While the value added inducement effect ranges between EGP 795-781 per EGP 1000 for sectors like Food and Tobacco and Clothing, it reaches only EGP 748 for the Engineering and Machinery sector, which collected a significant share of the stimulus spending. Comparable estimates for Water and Sewage, Other Construction and Building, Roads and Bridges and Other Productive Services fall between EGP 1084-1023. The divergence between the created value added inducement and the value added generated by the sector is positive for just 8 of the 22 sectors: Engineering and Machinery, Building, Roads and Bridges, Water and Sewage, Other Construction and Building, Food and Tobacco,

Spinning and Weaving and Electricity Stations. With the exception of Social Services and Other and Productive Services, therefore, the actual fiscal stimulus distribution seems able to channel funds to the sectors in the economy with relative high value added inducement.

TABLE 3B. VALUE ADDED INDUCEMENT WITH ALTERNATIVE ASSUMPTIONS ABOUT EXPORT SUPPLY AND HOUSEHOLD DEMAND ELASTICITIES

Sector	Unitary Elasticity		Low Elasticity		Moderate Elasticity		High Elasticity	
	$\eta_E=\eta_H=1$		$\eta_E=1$; $\eta_H=0.5$		$\eta_E=2$; $\eta_H=1$		$\eta_E=3$; $\eta_H=2$	
	Created	Sectoral	Created	Sectoral	Created	Sectoral.	Created	Sectoral
Agriculture								
Vegetarian	30.421	511.426	30.421	505.675	55.199	617.244	79.976	734.564
Animal	0.270	125.484	0.270	123.932	0.540	144.630	0.810	166.880
Industry								
Oil & Mineral Extract.	453.552	1286.262	453.552	1277.287	907.104	1890.675	1360.656	2513.039
Food and Tobacco	252.543	171.580	252.543	169.999	358.544	217.523	464.544	266.626
Spinning & Weaving	386.613	188.550	386.613	188.074	406.593	200.101	426.573	212.603
Clothing	24.249	25.124	24.249	24.858	27.430	27.926	30.612	31.260
Chemical Industry	123.951	440.650	123.951	437.669	180.777	480.983	237.602	527.279
Petroleum Products	107.234	120.921	107.234	119.909	168.577	149.050	229.920	179.204
Non-Metal Industry	133.256	593.017	133.256	592.309	227.328	657.069	321.401	722.536
Base Metals	215.658	633.129	215.658	627.141	365.594	733.592	515.531	846.030
Metal Industry	15.826	275.082	15.826	274.071	24.997	280.794	34.167	288.527
Eng. & Machinery	1589.970	907.265	1403.067	810.269	1609.954	923.013	2003.744	1132.753
Electricity	0.298	108.068	0.298	105.544	0.596	119.439	0.893	135.857
Building	434.107	222.338	434.107	221.872	445.836	230.957	457.566	240.508
Roads and Bridges	2516.706	1286.079	2516.706	1286.079	2517.388	1286.428	2518.070	1286.776
Water and Sewage	7623.062	4928.850	7623.062	4928.850	7623.919	4929.405	7624.776	4929.959
Electricity Stations	0.110	0.055	0.110	0.055	0.220	0.109	0.330	0.164
Other Constr. & Bldg	227.462	101.010	227.462	101.005	241.867	107.345	256.271	113.690
Other Industry	75.601	96.104	75.601	94.563	97.867	111.958	120.134	130.894
Services								
Transprt & Comm.	313.407	699.944	313.407	693.736	626.815	953.968	940.222	1220.408
Other Prod. Services	921.175	1639.857	921.175	1613.667	1656.212	2285.424	2391.249	2983.371
Social Services	329.421	716.601	329.421	703.320	363.853	793.254	398.284	896.469
Household	0.000	697.497	0.000	688.104	0.000	766.322	0.000	853.933
Change in GDP	15.775		15.588		17.907		20.413	
VA Inducement Coef.	1.02		1.02		1.02		1.01	
Rate of Change (%)	1.76		1.74		2.00		2.28	

Notes:
[1] Export Elasticity (η_E) is the percentage change in the supply of exports owing to one percentage change in the domestic price of exports; household demand elasticity (η_H) is the percentage change in household demand owing to one percentage change in consumer prices. All values are in EGP million except change in GDP in EGP billion.
Source: Computed from Egypt I-O 2007/2008 (IDSC 2009).

The value added inducement coefficient estimate, under the unitary elasticity assumption, is less than 1 percent greater than the equivalent estimate assuming

equal allocation of the increase in final demand across sectors. Furthermore, table 3b reveals no visible disparity in the inducement coefficient estimates, when the size of the elasticities is changed within the specified limits. In general, the findings in table 3b illustrate that the FSP 2008/2009 spending could increase the rate of GDP growth between 1.74-2.28 percent, depending on the chosen values of elasticities. These economic growth estimates seem comparable with similar rates for other countries (Scott 2008).

Finally, it is possible to evaluate the change in labor income arising from the stimulus. The change (results not shown) is determined by the total employment coefficient given the stipulated increase in final demand. The empirical estimates suggest that labor income could rise by EGP 3.66, 3.61, 4.02 and 4.48 billion assuming unitary, low, moderate and high elasticities, respectively, with the corresponding labor income growth rate ranging between 1.55-1.92 percent. These relatively large estimates highlight the important role employment has to play in the economic growth generated by the FSP 2008/2009 spending.

5. DATA LIMITATION CONSIDERATIONS

It is possible the above results suffer from bias resulting from limitation on the availability and accuracy of statistical data. Reference was made earlier to critical limitations, e.g., missing data on sectoral stimulus allocation and elasticities. Rather than bemoan data quality and paucity problems, different conjectures were proposed and short-cuts taken to partly remedy various data impediments. Data deficiency problems combined with imprecise corrective statistical measures could seriously impair the reliability and limit the scope of the policy advice inferred from the findings. This section focuses on the problems encountered with the data during this study and the corrective measures undertaken so that the readers themselves may better judge the quality of the reported results.

Despite the measures taken to improve the reliability and quality of the data, the updated Egypt I-O 2007/2008 table suffers from several problems and limitations. Some of these problems arose from the multiplicity of data sources. Data inconsistencies surface because of variations in the approaches and definitions used by alternative sources. For instance, the MOED sector classification is not consistent with the industrial production, the Ministry of Economic Development and the balance of payments classifications. Moreover, there are significant discrepancies between the exports and imports statistics from the MOED (resources and uses of GDP), CAPMAS (exports/imports activity) and the CBE (balance of payments accounts) because of contradictory assumptions and methods used in calculating statistical indicators.[25] These inconsistencies jeopardize the statistical integrity of the Egyptian national accounts, as they sever the balance between the macroeconomic aggregates and the constituents of the national accounts.

Untimely availability of important components of the national accounts is also a serious problem in Egypt. Recent data on key variables that enter into the I-O accounts including, technical coefficients, capital income, depreciation and investment by sector of origin and destination are virtually unavailable.

[25] For instance, in contrast with the CBE statistics, services are excluded from the CAPMAS exports/imports transactions.

In Egypt I-O 2007/2008, the construction and building sector is decomposed into 5 sectors. The decomposition is based on the CBSB database (CAPMAS 2007). The CBSB provides, on annual basis, most of the data for output, inputs of goods and services, labor and wages that could be needed to calculate the I-O technical coefficients for the construction and building sectors.

The CBSB data encompasses several deficiencies. A main problem identified earlier (box 3) concerns the inconsistency of the time horizon, over which the data on construction and building activities are reported for private (calendar year) and public (fiscal year) sector companies. Since the public sector constitutes around 10 percent of the total volume of the construction and buildings activities, the problem was evaded with the inclusion of the private sector data only in the construction of the I-O accounts. Furthermore, the CBSB survey covers only large companies, whose annual operations exceed EGP 4 million. Hence, the smaller companies in the sector were *de facto* barred from representation in the I-O database. Because the large companies are typically capital-intensive, the lack of data for small companies, which are relatively more labor-intensive, may bias the results that were derived.

The input requirements for companies in the CBSB sample are classified either by type of economic activity (e.g., building and maintenance of houses, water stations, roads, bridges, tunnels and electricity stations) or by objective of the activity (e.g., building vs. construction). The two classifications are incompatible; moreover, the attempts to merge both classifications were not always straightforward. For instance, the reclassification of the Water and Sewage inputs by activity implied negative sectoral value added. Hence, the difference between value of output and value added for the sector was used to calculate the total value of intermediate inputs. The value of intermediates was then distributed across the different activities according to the weights suggested by the relative shares of inputs for the sector presented in the CBSB.

The employment and wages reported for different sectors in the CBSB were not always consistent with the comparable national accounts statistics. Two sets of weights were considered to iron out the inconsistencies. The first set was derived on the basis of the share of labor income in the total value of output for each sector in construction and building. The second set was obtained as the ratio of labor income in each sector to the total labor income for construction and building. A suitable set of weights was eventually chosen to estimate employment and wages for each sector on the basis of expert opinion.

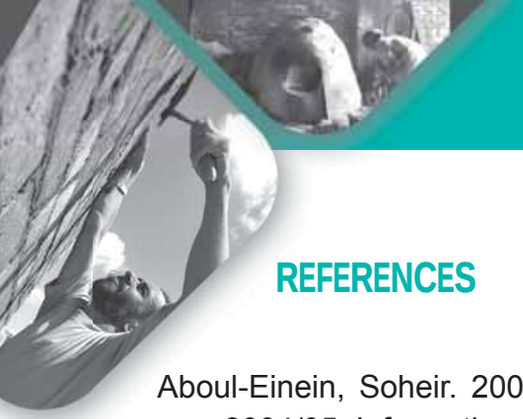
Finally, because the I-O database does not distinguish between public and private sector activities, the impact of the increase in demand originating as a result of the FSP would be identical to any increase in demand by the private sector. But considerable evidence suggests that the productivity of public spending is significantly lower than that of the private sector, especially due to presumably large leakages to the public spending in Egypt. More data and information on those leakages is needed before the results can be extended in that direction.

6. CONCLUDING REMARKS

The main objective of this study is to apprise the policymakers on the short-run employment and economic growth effects of the first Egyptian stimulus package, FSP 2008/2009. The package has disbursed an overall sum of over EGP 15.5 billion across different productive sectors, mainly Water and Sewage, Roads and Bridges, Building, Other Construction and Building (excluding Electricity Stations), Engineering and Machinery and Productive Services. The stimulus expenditure represented around 1.5 percent of GDP. The results of the study were obtained using an I-O model. Mainly owing to its simplicity, the model seems rather suitable to accommodate the limitations imposed by the quality and deficiency of the Egyptian macroeconomic data.

The findings of the study show that the stimulus is expected to create between 661- 730 thousand new job vacancies, depending on the assumed levels of elasticity of household demand and export supply. This corresponds to 3.2- 3.5 percent growth in the total number of new job vacancies. The rise in the number of jobs is associated with an increase in the rate of GDP growth between 1.7-2.3 percent, which seems consistent with the estimates reported for other countries.

The results of the study are marred by various shortcomings, importantly data limitations that were discussed with some detail. All through, the study has made use of official statistics some of which appeared rather dubious. The excessively low sectoral wage rate data represent a good case in point. Using official sectoral wages leads to seemingly large upward bias in the FSP job creation estimates that might not be consistent with the reality of the economy in Egypt. Repeating the computations after doubling the wage rate (based on expert opinion) for the Roads and Bridges and the Water and Sewage sectors only results in a significantly smaller number of overall jobs created estimates (298 thousand in lieu of 665 thousand new jobs under the unitary elasticity assumption). The difference between these estimates emphasizes the importance of having better statistics for sound policymaking in Egypt.



REFERENCES

Aboul-Einein, Soheir. 2006. Estimating a social accounting matrix for the Egyptian economy 2004/05. Information and Decision Support Center (IDSC) Research Publication.

AMCHAM (American Chamber of Commerce in Egypt). 2009. http://www.amcham.org.eg/BSAC/ustrade/ QIZ.asp.

Angelov, Georgi, and Simeon Djankov. 2009. *Tax stimulus as crisis response.* http://crisistalk.worldbank.org/files/Tax%20Stimulus%20as%20Crisis%20Response-18012009.pdf.

Atkinson, Robert, Daniel Castro, and Stephen Ezell. 2009. *The digital road to recovery*: *A stimulus plan to create jobs, boost productivity and revitalize America*. The Information Technology and Innovation Foundation. http://www.itif.org/files/roadtorecovery.pdf.

Cail, Junning, and PingSun Leung. 2002. *The linkages of agriculture to Hawaii's economy.* Cooperation extension service. Economic Issues EI-4.College of Tropical Agriculture and Human Resources. University of Hawai'i at Mānoa.

CAPMAS (Central Authority for Public Mobilization and Statistics). 1996. Egypt input output table 1991/92.

———. 2007. Annual Construction and Building Statistical Bulletin.

CBE (Central Bank of Egypt). 2009. Monthly Statistical Bulletin. http://www.cbe.org.eg/yearbulletin.asp.

Chenery, Hollis B., and Tsunehiko Watanabe. 1958. International comparisons of the structure of production. *Econometrica* 26 (4): 487-521.

Crandall, Robert, Charles Jackson, and Hal Singer. 2003. *The effect of ubiquitous broadband adoption on investment, jobs, and the U.S. economy*. Criterion Economics L.L.C. http://www.newmillenniumresearch.org/archive/bbstudyreport_091703.pdf.

Crandall, Robert, William Lehr, and Robert Litan. 2007. *The effects of broadband deployment on output and employment: A cross-sectional analysis of U.S. data*. Issues in Economic Policy, The Brookings Institution No: 6.

Dervis, Kemal, Jaime De Melo, and Sherman Robinson. 1982. *General equilibrium models for development policy.* Cambridge University Press. New York. U.S.

DTFA (Department of Treasury and Finance of Australia). 2009. *Employment and public infrastructure: An estimation framework (technical paper)*. Victoria. Australia.

Flaherty, James M. 2009. *Canada's economic action plan*, the budget speech 2009. Department of Finance, Canada.

He, Dong, Zhiwei Zhang, and Wenlang Zhang. 2009. *How large will be the effect of China's fiscal stimulus package on output and employment?* Hong Kong Monetary Authority. Working paper 05/2009.

IDSC (Information and Decision Support Center). 2009. Egypt input output table (I-O) 2007/08. Unpublished.

ILO (International Labour Organization). International Institute for Labour Studies (IILS). 2009. *The financial and economic crisis: A decent work response*. Geneva. http://www.ilo.org/public/english/bureau/inst/download/tackling.pdf.

IMF (International Monetary Fund). 2009. *Update on fiscal stimulus and financial sector measures.* Washington, D.C. http://imf.org/external/np/fad/2009/042609.pdf.

Katz, Raul, Patrick Zenhäusern, and Stephen Suter. 2008. An evaluation of socio-economic impact of a fiber network in Switzerland, mimeo, polynomics and telecom advisory services, LLC.

Katz, Raul, and Stephan Suter. 2009. *Estimating the economic impact of the broadband stimulus plan*. Columbia Institute for Tele-Information. Columbia Business School.

Khatiwada, Sameer. 2009. *Stimulus packages to counter global economic crisis: A review*. International Institute for Labour Studies. Discussion Paper DP 196/2009. Geneva. Switzerland.

Kula, Mehmet. 2008. *Supply-USE and input-output tables, backward and forward linkages of the Turkish economy.* The 16th Inforum World Conference in Northern Cyprus 01–05 September 2008.

Levine, Linda. 2009. *Job loss and infrastructure job creation during the recession*. Congressional Research Service (CRS). Report R40080. http://assets.opencrs.com/rpts/R40080_20090317. pdf.

MOED (Ministry of Economic Development). 2008. *Follow up report on economic and social development plan 2007/08.*

———. 2009a. *Egyptian fiscal stimulus package 2008/09 breakdown*. Unpublished Data.

———. 2009b. *Follow up report on economic and social development plan during the third quarter of 2008/09*.

———. 2009c. Number of Workers (Private/Public) distributed by Economic Sectors. http://www.mop.gov.eg/work.htm.

MOF (Ministry of Finance). 2009. *The analytical statement for the state budget for the fiscal year 2007/08.* http://www.mof.gov.eg/English/Main+Topics/The+State+Budget+2007-2008.htm

MOTI (Ministry of Trade and Industry). 2009. http://www.qizegypt.gov.eg/Data_QIZCompanyinfo.aspx.

Mouhammed, Adil. 2000. *Quantitative methods for business and economics.* M.E Sharpe Inc. New York. U.S.

OECD (Organization for Economic Co-operation and Development). 2009. *Fiscal packages across OECD countries: Overview and country details.* Paris, Cedex. http://www.nens.it/_public-file/OECD%20Fiscal%20packages%20across%20OECD%20countries.pdf.

PACG (Personnel Administration Consulting Group). 2009. Sudden impact: *An assessment of short-term economic impacts of water and wastewater construction projects in the United States*. Clean Water Council (CWC). Arlington. Virginia. U.S.

Prasad, Eswar, and Isaac Sorkin. 2009. *Assessing the G-20 economic stimulus plans:* A deeper look. The Brookings Institution, Washington, D.C. http://www.brookings.edu/~/media/Files/rc/articles/2009/03_g20_stimulus_prasad/03_g20_stimulus_prasad.pdf.

Ramadan, Omneya. 2009. *Egypt response to the global crises*. Ministry of Finance. Macro Fiscal Policy Unit.

Rasmussen, P. Norregaard 1957. *Studies in intersectoral relations*. North-Holland Publishing Company. Amsterdam.

Saha, David, and Jakob von Weizsäcker. 2009. *Estimating the size of the European stimulus packages for 2009: An update. Bruegel Policy Contribution*. http://www.bruegel.org/uploads/tx_btbbreugel /pc_simulus_290609.pdf.KER

Scott, Alasdair. 2008. Making Fiscal Stimulus Effective During Downturns. IMF Survey Magazine. IMF Research. http://www.qizegypt.gov.eg/Data_QIZCompanyinfo.aspx..

USDTFHA (United States Department of Transportation Federal Highway Administration Office of Transportation Policy Studies). 1997. *Highway infrastructure investment and job generation: A look at the positive employment impacts of highway investment*. U.S. Department of Transportation. Washington. DC.

USDTFHA (United States Department of Transportation Federal Highway Administration Office of Transportation Policy Studies). 2006. *JOBMOD2.1: A comprehensive model for estimating employment generation from federal-aid highway projects (technical documentation)*. http://www.fhwa.dot.gov/policy/otps/ /pc_simulus_290609.pdf

UNECLAC (United Nations Economic Commission for Latin America and the Caribbean). 2009. *The reactions of the governments of the Americas to the international crisis: An overview of policy measures up to 31 May 2009*. United Nations Publication. Santiago. Chile.

UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific). 2009. *Fiscal stimulus packages in selected Asia-Pacific Countries*. Bangkok. http://www.unescap.org/pdd/publications/survey2009/stimulus/fiscal-stimulus.pdf

Zhang, Yanchun, Nina Thelen, and Aparna Rao. 2009. *Social protection in fiscal stimulus packages: Some evidence*. UNDP (United Nations Development Programme).

Zandi, Mark M. 2008. *Assessing the macro economic impact of fiscal stimulus* 2008. Moody's Economy.com. http://www.economy.com/mark-zandi/documents/assissing-the-impact-of-the-fiscal-stimulus.pdf.

APPENDIX

TABLE A1. FSP 2008/ 2009 EXPENDITURE BREAKDOWN

(EGP Million)

Budget Sector	Outlays	Total
I. Investment Expenditure		10832.0
I.I General Budget Sector	10232.0	
Potable water	3820.0	
National project for providing 240 villages with drinking water	468.0	
Drinking water projects (different governorates)	3352.0	
Sewage projects	3210.0	
National project for extending sewage service to villages	766.0	
Sewage projects (different governorates)	2444.0	
Building roads and bridges	1000.0	
Cairo-Alexandria desert road	519.0	
Badr-Banha Circular road	150.0	
Zagazig-Sinbelaween road	54.1	
International coast road	87.9	
Dokki-6 October bus route	37.0	
Tanta-Kafr-El Sheikh road	52.0	
Shobra-Banha freeway	100.0	
Domestic development projects (different governorates)	1000.0	
Building basic health care centers	400.0	
First-aid care	100.0	
Advanced medical equipment	300.0	
Building schools	150.0	
Others	652.0	
Mosques rehabilitation and restoration	50.0	
Developing fire-fighting equipment and stations	200.0	
Ministry of Justice	50.0	
Administrative development (for goods and services outlets)	182.0	
Building university hospitals	170.0	
I.II Economic Authorities	600.0	
Improving efficiency of railways	400.0	
Developing East Port-Said sea port infrastructure	50.0	
Improving the capacity of Red Sea ports	150.0	
II. Current Expenditure (Transfers/Subsidies)		2700.0
Increasing competitiveness of Egyptian exports	2100.0	
Supporting industrial zones in Delta region	400.0	
Supporting logistic areas for internal trade	200.0	
III. Customs Duties and Sales Tax		2000.0
Reduction of custom duties on selected industrial inputs and capital goods	1500.0	
Temporary lift of sales tax on selected capital goods	500.0	
Overall Expenditure		15532.0

Source: Ramadan (2009) and MOED (2009a).

TABLE A2. BASIC SECTORAL INDICATORS FROM EGYPT I-O 2007/ 2008

Sector	BL_W[1]	FL_W[1]	BL_R[2]	FL_R[2]	X/L[3]	X/K[3]	K/L[3]	VA_S[4]	C/X[3]	I/X[3]	WAG[5]	L[6]
Agriculture												
Vegetarian	0.174	0.499	1.445	2.277	6.623	1.555	4.267	0.099	0.489	0.000	3.875	4.318
Animal	0.178	0.050	1.449	1.249	6.494	1.522	4.267	0.028	0.755	0.001	3.866	1.227
Industry												
Oil & Mineral Extract.	0.090	1.490	1.150	3.655	55.556	1.151	47.231	0.158	0.015	0.001	24.085	0.121
Food and Tobacco	0.521	0.188	1.858	2.031	13.514	6.289	2.159	0.028	0.640	0.001	18.121	0.591
Spinning & Weaving	0.519	0.340	1.995	1.513	12.821	5.988	2.159	0.007	0.223	0.017	2.064	0.726
Clothing	0.461	0.011	1.910	1.150	23.810	11.111	2.159	0.005	0.878	0.002	4.025	0.233
Chemical Industry	0.413	0.746	1.762	2.108	8.929	4.149	2.159	0.028	0.414	0.012	137.286	0.047
Petroleum Products	0.717	0.331	1.948	1.606	12.346	0.540	22.975	0.011	0.148	0.000	65.505	0.044
Non-Metal Industry	0.238	0.462	1.625	1.534	4.739	2.198	2.159	0.023	0.186	0.023	23.754	0.243
Base Metals	0.261	0.687	1.593	1.849	5.525	2.558	2.159	0.035	0.042	0.179	54.561	0.172
Metal Industry	0.394	0.174	1.735	1.201	10.989	5.128	2.159	0.003	0.196	0.056	5.101	0.106
Eng. & Machinery	0.256	0.155	1.530	1.265	10.204	4.717	2.159	0.016	0.273	0.342	11.498	0.316
Electricity	0.310	0.153	1.606	1.306	4.831	2.717	1.775	0.016	0.381	0.027	17.478	0.292
Construction												
Building	0.486	0.145	1.912	1.204	13.514	3.289	4.078	0.021	0.000	0.705	4.962	0.667
Roads and Bridges	0.361	0.000	1.751	1.000	7.519	2.825	2.649	0.001	0.000	0.856	1.443	0.193
Water and Sewage	0.242	0.000	1.575	1.000	6.803	3.215	2.108	0.002	0.000	0.830	4.141	0.077
Electricity Stations	0.401	0.000	1.734	1.000	19.231	3.311	5.781	0.000	0.000	0.840	3.038	0.006
Other Constr. & Bldg	0.376	0.010	1.887	1.012	4.292	5.236	0.819	0.022	0.000	0.841	14.066	0.698
Other Industry	0.285	0.123	1.533	1.398	20.000	9.174	2.159	0.013	0.641	0.027	7.933	0.321
Services												
Productive Services												
Transprt & Comm.	0.244	0.237	1.535	1.808	7.692	1.742	4.417	0.104	0.549	0.011	16.269	1.037
Other Prod. Services	0.204	1.066	1.443	3.404	9.259	1.842	5.001	0.235	0.345	0.073	12.518	2.529
Social Services	0.261	0.523	2.026	2.432	1.946	5.525	0.351	0.146	0.531	0.012	14.122	6.846

Notes:

[1,2] Watanabe backward (BL_W) and forward (FL_W) linkages are the sum of the column ($\sum_i a_{ij}$) and row ($\sum_j a_{ij}$) elements, respectively, of the Leontief matrix *(A)* where $a_{ij}=\frac{x_{ij}}{X_j}$, x_{ij} is the flow of intermediate (domestic) inputs from sector *i* to *j* and X_j is the output of sector *j* (Chenery and Watanabe 1958). Rasmussen backward (BL_R) and forward (FL_R) linkages are the sum of the column ($\sum_i b_{ij}$) and row ($\sum_j b_{ij}$) elements, respectively, of the Leontief inverse matrix $B = (I-A)^{-1}$ where *I* is the $n \times n$ identity matrix. [3] *L, K, C* and *I* are labor, capital, consumption and investment, respectively (Rasmussen 1957). [4] Share of value added (at market price) in GDP. [5] Average annual wage rate in EGP thousand. [6] Number of workers (*L*) measured in million.

Source: Computed from Egypt I-O 2007/2008 (IDSC 2009) and supplementary national accounts data (MOED 2009c).

TABLE A3. TYPE I MULTIPLIERS AND COEFFICIENTS

Sector	Employment			Vacancies			Value Added Inducement		
	ml	*empl*		*mj*	*empj*		*mva*	*empva*	
		Total	Direct		Total	Direct		Total	Direct
Agriculture									
Vegetarian	1.199	0.181	0.163	1.113	0.043	0.042	1.199	0.955	0.860
Animal	1.200	0.185	0.154	1.146	0.046	0.040	1.195	0.973	0.816
Industry									
Oil & Mineral Extract.	1.627	0.030	0.019	2.108	0.002	0.001	1.090	0.977	0.940
Food and Tobacco	2.127	0.157	0.075	4.609	0.019	0.004	3.722	0.644	0.177
Spinning & Weaving	2.535	0.197	0.092	1.406	0.053	0.045	2.334	0.780	0.397
Clothing	4.759	0.199	0.042	2.620	0.027	0.010	3.093	0.589	0.191
Chemical Industry	1.507	0.168	0.120	5.493	0.004	0.001	1.876	0.802	0.458
Petroleum Products	1.398	0.113	0.081	2.707	0.003	0.001	3.544	0.964	0.274
Non-Metal Industry	1.130	0.238	0.211	1.197	0.011	0.009	1.297	0.963	0.745
Base Metals	1.210	0.219	0.189	1.695	0.006	0.003	1.398	0.842	0.628
Metal Industry	1.865	0.169	0.091	1.246	0.022	0.018	1.803	0.761	0.424
Eng. & Machinery	1.584	0.156	0.100	1.468	0.013	0.009	1.566	0.598	0.387
Electricity	1.056	0.219	0.207	1.057	0.013	0.012	1.511	0.892	0.591
Building	2.324	0.173	0.082	1.360	0.020	0.017	2.003	0.839	0.464
Roads and Bridges	1.539	0.205	0.133	1.033	0.096	0.092	1.587	0.850	0.536
Water and Sewage	1.305	0.192	0.147	1.084	0.039	0.036	1.282	0.899	0.701
Electricity Stations	2.373	0.124	0.052	1.181	0.020	0.017	1.745	0.782	0.448
Other Constr. & Bldg	1.318	0.306	0.233	1.179	0.019	0.017	1.669	0.770	0.461
Other Industry	2.301	0.116	0.052	1.755	0.011	0.007	2.023	0.476	0.241
Services									
Transprt & Comm.	1.254	0.163	0.132	1.342	0.011	0.008	1.291	0.931	0.734
Other Prod. Services	1.263	0.137	0.114	1.323	0.011	0.009	1.235	0.891	0.757
Social Services	1.112	0.572	0.546	1.159	0.042	0.039	1.325	0.924	0.741

Source: Computed from Egypt I-O 2007/2008 (IDSC 2009).

TABLE A4. INCREASE IN FINAL DEMAND UNDER ALTERNATIVE ASSUMPTIONS FOR EXPORT SUPPLY AND HOUSEHOLD DEMAND ELASTICITIES

(EGP Million)

Sector	Unitary Elasticity $\eta_E=\eta_H=1$	Low Elasticity $\eta_E=1$; $\eta_H=0.5$	Moderate Elasticity $\eta_E=2$; $\eta_H=1$	High Elasticity $\eta_E=3$; $\eta_H=2$
Agriculture				
Vegetarian	26.951	26.951	48.901	70.852
Animal	0.235	0.235	0.469	0.704
Industry				
Oil & Mineral Extract.	450.771	450.771	901.541	1352.312
Food and Tobacco	317.421	317.421	450.653	583.885
Spinning & Weaving	398.828	398.828	419.439	440.050
Clothing	31.041	31.041	35.113	39.186
Chemical Industry	128.477	128.477	187.377	246.278
Petroleum Products	100.009	100.009	157.218	214.428
Non-Metal Industry	111.794	111.794	190.714	269.635
Base Metals	204.777	204.777	347.149	489.521
Metal Industry	17.126	17.126	27.049	36.972
Eng. & Machinery	2126.730	1876.730	2153.460	2680.190
Electricity	0.270	0.270	0.540	0.810
Building	431.663	431.663	443.327	454.990
Roads and Bridges	2400.651	2400.651	2401.301	2401.952
Water and Sewage	7030.791	7030.791	7031.581	7032.372
Electricity Stations	0.122	0.122	0.244	0.366
Other Constr. & Bldg	213.522	213.522	227.043	240.565
Other Industry	128.664	128.664	166.559	204.455
Services				
Transprt & Comm.	288.121	288.121	576.242	864.363
Other Prod. Services	900.694	900.694	1619.389	2338.083
Social Services	223.344	223.344	246.689	270.033
Total	15532	15282	17632	20232

Notes:
[1] Export Elasticity (η_E) is the percentage change in the supply of exports owing to one percentage change in the domestic price of exports; household demand elasticity (η_H) is the percentage change in household demand owing to one percentage change in consumer prices.
Source: Computed using tables 1 and A1 and Egypt I-O 2007/2008 (IDSC 2009).