Can Fuel Subsidy Reforms in Egypt Reduce Budget Deficit without Harming the Poor?

Ahmed Fathy, Khalid Siddig, Naglaa El-sodany, Asmaa Samieh, Amani Shahin, Noura Abdelwahab

April 2016

Paper accepted for presentation in the 19th Annual Conference on Global Economic Analysis "Analytical Foundations for Cooperation in a Multipolar World" June 15-17, 2016, Washington DC, USA.

Abstract

This paper assesses the economic implications of cutting down of petroleum subsidies in Egypt in 2012. A number of policy scenarios is simulated with a static CGE model and an updated SAM for the fiscal year 2012/13 that reflects disaggregated households sector, disaggregated enterprises disaggregated factors of production, disaggregated energy sectors and disaggregated food subsidies sectors. Results reveal that the Egyptian households witness welfare losses, should the petroleum subsidies be abolished, while the economy's GDP increases.

1 Introduction

Subsidy system is perceived as an important aspect of the social safety net for poor segments to the Egyptian population as it historically has tended to provide necessary protection against the negative impacts that result from the adoption of structural adjustment programs (SAP) and economic reforms. The government of Egypt started to implement the subsidies program (namely on food) since the World War II where it constituted around 14 percent of total government budget, while those on fuel started in mid 1950s (Coleman, 2015). However, in early 1990's and after the SAP that were implemented by the government in order to meet the World Bank conditions, subsidy share in the government budget (especially food subsides) has massively declined to reach about 4 percent of government budget. Nevertheless, subsidies share in the government budget started in increase again since 2005 (James, 2015).

Subsidies share in the government of Egypt expenditure reached 25.7 percent in 2012/13, constituting around 10.2 percent of GDP, where petroleum subsidies accounted for around 70 percent of total subsides and food subsides accounted for around 19 percent of total subsides (Ministry of Finance, 2015). Due to fiscal pressures that resulted from widening sharply the budget deficit from under 8 percent of GDP in 2010 to 14 percent in 2013 and the increase in the government

debt from 73 percent of GDP to 89 percent during the same period (Ministry of Finance, 2015), the government had to cut energy subsides spending by 44 billion Egyptian pounds (LE) (US$6.2 billion) in the 2014/15 fiscal year starting in July 2014 (Middle East Monitor, 2014). The concerned petroleum products are diesel, LPG, gasoline 80, gasoline 92, kerosene and gasoline 95.

The cuts in subsidy led to an increase in the prices of diesel (mainly used for electricity and transportation) by 64 percent, LPG by 37.5 percent, gasoline 80 (the most common fuel for the older taxis largely used in Egypt) by 78 percent, gasoline 92 (consumed by rich households for most domestic vehicles) by 41 percent, kerosene by 64 percent and gasoline 95 (luxury, diplomatic and high-level government vehicles) by 7 percent (Ministry of Petroleum, 2014). The share of the subsidy on diesel, LPG, gasoline (80, 92 and 95) and natural gas in total fuel subsidy in 2012/13 was 51 percent, 25 percent, 20 percent and 4 percent, respectively (Ministry of Finance, 2015).

To Cushion the impact of the cuts in energy subsidy, the government initiated cash transfer programs for vulnerable, elderly and disabled households and allocated LE 2.5 billion (US$ 0.32 billion) in 2014/15 to this program that opts to target 10 million households and implemented in a number of waves over 3 years starting from 2015 (Ministry of Social Solidarity, 2015).

The cuts in energy subsidy has also been motivated by its poor targeting, it disproportionally benefit the rich. Even the subsidy for kerosene involves substantial leakage to the non-poor, with almost 48 percent of the subsidy accruing to the top 60 per cent of households (Abouleinen et al., 2009). An IMF study (Coady et al., 2006) found that the bottom 40 percent of the population typically receive only 15-25 percent of the value of energy subsidies. World Bank (2005) calculated the benefit incidence of energy subsidies shows that 34 percent of these subsidies go to the top quintile while 17 percent only go to the poorest quintile.

A number of studies has assessed the impact of phasing out of energy subsidies on the Egyptian economy using Computable General Equilibrium (CGE) models as Choucri (1984), Blitzer et al. (1989) and Khorshid and Lofgren (1992), where they have depended mainly on constructing or mapping a SAM that is used in the CGE

model to analyse the macroeconomic effects of changes in domestic and world energy prices. Those studies has shown positive welfare impacts that results from phasing out of energy subsidies and the adoption of appropriate domestic pricing strategy.

This paper analyses various policy options that face the Egyptian government recently based on which the policy makers in the country are expected to address the challenges facing the economy and people. The severe budget deficit of the last decade and the growing prevalence of poverty among the Egyptian households are two contradicting options that policy makers are to address simultaneously. A detailed analysis that accounts for the macroeconomic variables from one hand and a comprehensive coverage of production activities, households and factor markets from the other hand is expected to provide urgently needed evidences to policy makers. Based on the applied model, data and policy scenarios, the study will provide policy recommendations on the impact of the different fuel subsidy policies on macroeconomic indicators, household income and expenditure and employment. Section two provides an overview of the energy sector in Egypt, while section three highlights the methodology used to update SAM 2012/13 and gives overview the used CGE model and policy simulations. While, section four is dedicated for the analysis of results and section five presents conclusions and policy recommendations.

2 Egypt's Energy Sector

Egypt is blessed with an abundance of natural resources to supply the country's energy needs. The energy sector includes energy derived from oil and gas, renewables such as wind, solar and hydropower, and other resources such as coal and nuclear. In this regard, oil and gas have long been the hallmark of Egypt's energy industry, supplying the vast majority of its fuel and electricity needs. Over the past decade, oil has seen its production plateau while natural gas experienced robust growth due to a ramp up in discoveries in the Western Desert and offshore fields. More recently, during the turmoil that followed the 2011 revolution, both hydrocarbons have seen a drop in production rates, with no concession agreements signed between 2010 and 2012 (American Chamber of Commerce, 2015).

Until only relatively recently, Egypt was a self-sufficient energy consumer, meeting its energy needs through local production. However, energy subsidies, meant to make energy more affordable, have pushed demand to dizzying heights and created an unsustainable subsidy bill along with it. Table 1 highlights the government expenditures on food and energy subsidies during the period 2007/08 till 2012/13, where energy subsidies represents more than 70% of government expenditures on subsidies.

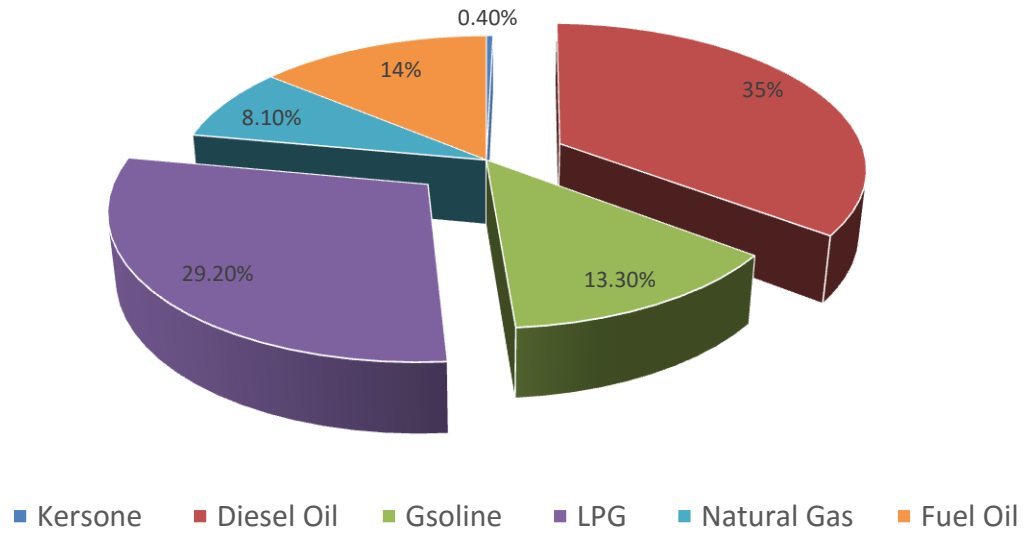
Table 1: Government Expenditures on Food and Petroleum (million USD*)

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Food Subsidies	2,356	3,019	2,410	4,691	4,338	3,811
Petroleum Subsidies	8,632	8,983	9,531	9,696	13,687	10,029

*1 USD= LE 6.98 using official rate for May 2013 exchange rate.

Source: Ministry of Finance, government Budget.

Figure 1: Structure of Petroleum Subsidies in 2012/13 Budget



Source: Ministry of Finance, 2012

Figure 1 shows that Diesel Oil and Kerosene constitutes the major share of the petroleum products subsidies that amount to 35 percent and 29.2 percent respectively in 2012 budget. While, in 2013/14, the total subsidy bill amounted to USD 18 billion, representing a 19% compound annual growth rate since 2010 and up from USD 0.15 billion nearly 20 years ago. The subsidy bill has caused ballooning government deficits and debt, drained foreign currency reserves and created tensions with the international oil and gas companies that operate in Egypt (Middle East Monitor, 2014).

Table 2 highlights the per capita consumption levels of different quintiles from energy using data from Household Income Expenditure and Consumption Survey 2004/05., where it reveals that the higher a household's income is, the higher its total level of expenditure is on all types of energy sources (with the exception of kerosene). Per capita expenditure of the richest quintile, on all energy sources, is over five times the expenditure of the poorest quintile for All Egypt and urban households, and over three times for rural households. The expenditure gap between the richest and the poorest is the highest for natural gas and gasoline (in fact, the top quintile accounts for more than 90 per cent of all gasoline consumption in Egypt as a whole and in urban areas, and three-quarters of total gasoline consumption in rural areas). Finally, for all of Egypt, the richest quintile spends on average four times the poorest quintile's expenditure on electricity and twice as much on LPG.

Table 2: Per capita annual expenditure by energy source and income quintiles (LE, 2005)

	Electricity	Natural gas	LPG	Kerosene	Gasoline	All energy	Total consumption
All Egypt							
Quintile 1	21.48	0.29	10.78	6.12	0.30	38.98	1,135.71
Quintile 2	29.52	0.64	14.32	4.18	0.67	49.33	1,609.98
Quintile 3	36.67	1.14	16.48	3.89	1.86	60.04	2,032.68
Quintile 4	47.39	2.39	18.65	3.31	4.62	76.36	2,633.48
Quintile 5	88.49	8.84	20.69	2.14	78.75	198.90	5,235.45
All	44.71	2.66	16.18	3.93	17.24	84.72	2,529.48
Urban							
Quintile 1	25.74	1.34	11.18	3.39	0.24	41.90	1,143.17

	Electricity	Natural gas	LPG	Kerosene	Gasoline	All energy	Total consumption
Quintile 2	35.00	2.18	14.21	2.04	0.74	54.16	1,619.46
Quintile 3	41.53	3.03	15.66	1.92	1.51	63.64	2,043.12
Quintile 4	51.67	4.65	17.20	1.65	4.60	79.77	2,655.84
Quintile 5	95.43	11.46	18.87	1.12	94.90	221.78	5,577.07
All	60.66	6.13	16.53	1.73	35.21	120.26	3,298.95
Rural							
Quintile 1	20.33	0.00	10.67	6.85	0.32	38.18	1,133.69
Quintile 2	27.25	0.00	14.36	5.07	0.64	47.32	1,606.04
Quintile 3	33.73	0.01	16.97	5.08	2.07	57.86	2,026.37
Quintile 4	42.86	0.00	20.18	5.06	4.64	72.74	2,609.81
Quintile 5	65.15	0.03	26.80	5.56	24.46	122.01	4,086.89
All	32.50	0.00	15.92	5.61	3.48	57.51	1,940.34

Source: Ministry of Finance, 2009.

In 2005, total direct household energy subsidies represented on average LE 247 per capita per annum, constituting almost 10 percent of total per capita annual consumption. The amount of subsidy received by households increases with expenditure and therefore income quintile – for example, the poorest quintile on average received LE 140 per capita for energy subsidies, whereas the richest quintile received over three times this amount, LE 451. Nevertheless, as a proportion of total income, subsidies are more important for the poorer quintiles (see Figure 2). Hence, while energy subsidies represented over 12 per cent of household expenditure for the bottom quintile, the corresponding percentage for the top quintile is 8.6 per cent (Ministry of Finance, 2014).

In July 2014, Egypt introduced long-awaited energy subsidy cuts. These had been in the pipeline for over five years, but repeatedly delayed by political instability. With energy subsidies habitually driving a large, structural fiscal deficit, and constant problems of shortages, low fuel and electricity prices were widely seen as a luxury that Egypt could no longer afford. The most significant step was the 64 per cent hike in diesel prices, but similar increases affected electricity and a wide range of refined products—the most notable exclusion being heavily subsidized liquefied petroleum gas (LPG). Moreover, the

subsidy reductions were set out as the first step in a five-year program to eliminate energy subsidies entirely (again, excluding LPG).

The cuts in subsidy led to an increase in the prices of diesel (mainly used for electricity and transportation) by 64 percent, LPG by 37.5 percent, gasoline 80 (the most common fuel for the older taxis largely used in Egypt) by 78 percent, gasoline 92 (consumed by rich households for most domestic vehicles) by 41 percent, kerosene by 64 percent and gasoline 95 (luxury, diplomatic and high-level government vehicles) by 7 percent (Ministry of Petroleum, 2014). The share of the subsidy on diesel, LPG, gasoline (80, 92 and 95) and natural gas in total fuel subsidy in 2012/13 was 51 percent, 25 percent, 20 percent and 4 percent, respectively (Ministry of Finance, 2015).

It is worth noting that the current reform represents only a first step in the process of reducing the burden of subsidies on the Egyptian budget and economy. In order for Egypt's subsidy burden to become more manageable, further price appreciation will be necessary, namely for the price of LPG and Gasoline 80 —the most highly subsidized of energy products in Egypt, which is used extensively by poorer households (Rohac, 2013).

3 Methodology

3.1 Model Description

A static single country Computable General Equilibrium (CGE) model calibrated to a 2012/2013 SAM for Egypt is used in this paper. The SAM is constructed to reflect the desired disaggregation in terms of commodities, activities, factor accounts and households. The data for the SAM comprises raw data for Supply and Use Table (SUT) for 2012/13, Households Income, Expenditure and Consumption Survey (HIECS) of the Central Agency for Public Mobilization and Statistics (CAPMAS) for 2012/2013, disaggregated data for petroleum products from the General Agency for Petroleum for 2012/13 and disaggregated data for food subsidies from the General Agency for Supply Commodities for 2012/13.

The SAM provides detailed commodity disaggregation including 20 agricultural, 6 mining, 40 industrial, 26 service, and 6 utilities and one construction commodities. Activities are disaggregated to include 3 agricultural, 5 mining, 30 industrial, 20 service, 5 utilities and 3 construction activities.

3.1.1 New disaggregation for SAM 2012/13

SAM 2012/13 has new disaggregation for the commodities, enterprises, Labor factor, and households as follows:

Commodities

Commodity accounts are disaggregated to include the different petroleum commodities that are subject to subsidies. These are diesel, LPG, gasoline 80, gasoline 92, kerosene and gasoline 95 that are produced by one activity. Nevertheless, these commodities are subject to different government policies (taxes and subsidies). In addition. Natural gas and crude oil have been separated into two commodities. Where S/U tables for 2012/13 and published data by the Central Agency of Petroleum are used to calculate of final consumption.

Moreover, commodity accounts are also disaggregated to include different food commodities that are subject to subsides. These are baladi bread, rice, sugar, pasta, cooking oil and tea. Where shares of final consumption are calculated using the shares of final consumption of these products in the S/U tables for 2012/13.

Factors of Production

Labour is classified to three categories (skilled – unskilled –semi-skilled) using HIECS 2012/13 published by CAPMAS, that is in line with the ILO international classification of occupation classification, which is considered skilled if they have a graduate or undergraduate degree, semi-skilled if they have a secondary school degree, and unskilled if they have only completed primary school or less.

Enterprises

Enterprises are disaggregated to four categories (financial/ non- financial) and (Public / Private) using national accounts data for 2012/13 published by Ministry of Planning, Monitoring and Administrative Reforms.

Households

Households are disaggregated to 10 categories (urban/rural) and (5 income quintiles) using HIECS data for 2012/13 published by CAPMAS.

Taxes

Taxes are disaggregated to include sales taxes, import taxes, production taxes, value added taxes and subsidies on activities, for petroleum products and food subsidies

3.1.2 Closures

The model depends on four closures as follows:

1. Long run full employment closure
2. Long run full employment and fiscal neutral closure
3. Long run with the existence of unemployment closure
4. Long run with the existence of unemployment and fiscal neutral closure

3.3 Policy Simulations

Four different scenarios are simulated in this paper as follows:

1) **Simulation 1:** reducing the subsidy on petroleum products by 30 percent.
2) **Simulation 2:** reducing the subsidy on petroleum products by 30 percent in the first year and another 30 percent in the second year.
3) **Simulation 3:** reducing the subsidy on petroleum products by 30 percent in the first year, 30 percent in the second year, full removal of the subsidy in the third year.
4) **Simulation 4:** reducing the subsidy on petroleum products by 30 percent accompanied by allocating an amount of LE 2.5 billion annually to poor households.
5) **Simulation 5:** reducing the subsidy on petroleum products by 30 percent in the first year accompanied by allocating half of the subsidy amount to the education and health service activities.

4 Analysis and Results

To be completed

5 Conclusions and Policy Recommendations

To be completed

6 References

Abouleinen, S., H. El-Laithy and H. Kheir-El-Din (2009). The impact of phasing out subsidies of petroleum energy products in Egypt. *ECES Working Paper 145*, available at: http://www.eces.org.eg/Publication.aspx?Id=273 [Accessed on March 1st, 2016].

American Chamber of Commerce (2015). *The Energy Sector in Egypt, Buisness Studies and Analysis Center*, Cairo.

Blitzer, C., R. Eckaus, and S. Lahiri. An Economy Wide Energy Model for Egypt (1989). Working Paper for Department of Economics, Massachusetts Institute of Technology, Cambridge.

Blitzer, C., R. Eckaus, S. Lahiri and A. Meeraus (1994). A General Equilibrium Model of the Effects of Carbon Emission Restrictions on Economic Growth in a Developing Country: Egypt. In J. Mercenier and T. Srinivasan, *Applied General Equilibrium and Economic Development: present achievements and future trends,* the University of Michigan Press, Michigan, pp. 255-278.

Butter, D. (2013). *Egypt in search of economic direction*. Chatham House, available at:http://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Middle%20East/bp_butter1113.pdf [Accessed on February 28, 2016].

Choucri, N. and S. Lahiri (1984). Short-run energy-economy interactions in Egypt, *World Development* 12, pp. 799-820.

Clarke, K. (2014). Energy Subsidy Country Update: Egypt Recent Subsidy Reforms, Global Subsidies Initiative, available at: https://www.iisd.org/GSI/sites/default/files/ffs_egypt_update_august_2014.pdf [Accessed on April 12, 2016].

Coady,D., M. El-Said, R. Gillingham, K. Kpodar, P. Medas, and D. Newhouse (2006). The Magnitude and Distribution of Fuel Subsidies: Evidence from Bolivia, Ghana, Jordan, Mali, and Sri Lanka, IMF Working Paper WP/06/247.

Coleman, I. (2015). *Reforming Egypt's Untenable Subsidies*, Council on Foreign Relations, available at: http://www.cfr.org/egypt/reforming-egypts-untenable-subsidies/p27885 [Accessed on February 14, 2016].

Decaluwé, B., A. Martens and L. Savard (2001). *La politique Économiques du Développment*, Université Francophone-Press de l'université de Montréal, Montréal, pp. 1-509.

Melo, J., and Tarr, D. (1992). *A General Equilibrium Analysis of US Foreign Trade Policy*, Cambridge, , MIT Press.

Eckaus, R. and Mohie-Eldin, A. (1979). A social accounting matrix for Egypt, SAM 1976, *Journal of Development Economics,* Vol 9, pp.183-203.

IMF (2014). *Regional economic outlook: Middle East and Central Asia*, available at: http://www.imf.org/external/pubs/ft/reo/2014/mcd/eng/mreo0514.htm [Accessed on March 15, 2016]

Goyder, B. (2014). Egypt under Sisi: Bread, freedom or social justice?, *Comment Middle East* , available at:http://www.commentmideast.com/2014/10/egypt-sisi-bread-freedom-social-justice/ [Accessed on March 15, 2016].

Hoekman, B. and Konan, D. (1999). Deep Integration, Nondiscrimination, and Euro-Mediterranean Free Trade, *World Bank Policy Research,* Working Paper no. 2130, Washington, World Bank.

Hoekman, B., D. Konan and K. Maskus (1998). An Egypt-U.S. free trade agreement: economic incentives and effects, World *Bank and CEPR*, University of Hawaii and University of Colorado.

Hosny, A. (2013). Survey of Recent Literature on CGE Trade Models: with Special Reference to the Case of Egypt, *Journal of World Economic Research*, Vol. 2, No. 1, pp. 9-19.

James, L. (2015). Recent Developments in Egypt's Fuel Subsidy Reform Process, *Global Subsidies Initiative and the International Institute for Sustainable Development*, Research Paper, Paris.

Khorshid, M. and H. Lofgren (1992). *A multi-sector CGE model for Egypt: structure and preliminary policy experiments*, Cairo University, Cairo.

Konan, D. and K. Maskus (1996). A Computable General Equilibrium Analysis of Egyptian Trade Liberalization Scenarios. *World Bank Working Paper*, No. 97-1, August.

Konan, D. and K. Maskus (2000). Joint trade liberalization and tax reform in a small open economy: The case of Egypt, *Journal of Development Economics*, 61 (2), pp. 365-392.

Lofgren, H. (1995). Macro and micro effects of subsidy cuts: A short-run CGE analysis for Egypt, *Middle East Business and Economic Review*, Vol.7, pp. 18-39.

Lofgren, H., L. Rebecca and R. Sherman (2002). A Standard Computable General Equilibrium (CGE) model in GAMS, *Microcomputers in Policy Research*, Vol.5. Washington, D. C.: IFPRI, available at: http://www.ifpri.org/pubs/microcom/micro5.htm [Accessed on March 12, 2016].

McCharthy, F. (1983). General equilibrium model for Egypt. In W. S. Kelley, A. C. and J. Williamson (eds), *Modeling growing economies, equlibruim and disequilibrium*, Duke Press Policy Studies, Durham, N. C., pp. 71-102.

Middle East Monitor (2014), *Egypt fuel consumption surges in anticipation of price hikes*, available at: https:// www.middleeastmonitor.com/news/africa/12530-egypt-fuel-consumption-surges-in-anticipation-of-price-hikes [Accessed on March 2, 2016].

Ministry of Finance. (2014). Medium-Term Macroeconomic Policy Framework, FY 2014/15 – FY 2018/19.

Ministry of Petroleum (2014), *Egypt Energy Price Schedule*.

Ministry of Social Solidarity (2015), Personal Interview with an Advisor at the Ministry of Social Solidarity.

Noueihed, L. and M. Georgy (2014). Egypt considering $1.5 billion foreign bond as it repairs economy: Finance minister, Reuters, available at: http://in.reuters.com/article/2014/10/23/us-mideast-investment-egypt-financeminis-idUSKCN0IC2ES20141023 [Accessed on March 12, 2016].

Rohac, D. (2013). Solving Egypt's subsidy problem. Policy Analysis No 741, Cato Institute, available at: http://www.cato.org/publications/policy-analysis/solving-egypts-subsidy-problem [Accessed on March 10, 2016].

Robinson, S. and C. Gelhar (1996). Impacts of Macroeconomic and Trade Policies on a market oriented agriculture. In L. Fletcher (ed.), *Egypt's Agriculture in a Reform Era*, Iowa state University Press, Iowa, pp. 271-293.

Taylor, L. (1979). *Macro-economics of Egyptian Food Subsidies :Macro models for Developing countries*, McGraw-Hill, New York, pp.58-66.

Thissen, M. (1994). *Liberalization Policy and Exogenous Shocks in the Egyptian Economy: A Macro Economic Analysis on the basis of a Computable General Equilibrium Model*. Master Thesis, University of Rotterdam, The Netherlands.

World Bank (2005). *Egypt - Toward a More Effective Social Policy: Subsidies and Social Safety Net*, Social and Economic Development Group, NO. 33550-EG, Washington D.C.