Journal of Economic Cooperation and Development, **37**, 2 (2016), 127-158

On the Removal of Energy Products Subsidies in an Importing Oil Country: Impacts on Prices and Policy Implications in Morocco

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Using input-output model, we analyze the effect of removing energy subsidies on prices in Morocco. We set three scenarios of increasing oil prices by 25%, 50% and 75%. We show that the effects on inputs prices are high in intensive oil products sectors such as transports, manufacturing industries, fishing and aquaculture, and, electricity and water sectors; with respectively 19.6%, 13.4%, 9.5% and 8.1% for 75% oil price increase scenario. Using the weights of the sectors, we deduce the overall cost increase generated by direct and indirect requirements for the total economy. An increase in oil prices by 75% generates an overall increasing cost between 5.5% and 8%. The generated cost-push inflation may alter the stable path of inflation recorded over the past fifteen years putting pressure on the monetary authorities. Therefore, the change of strategy from fixed exchange rate regime towards a flexible regime is an urgent option.

1. Introduction

Reforming subsidies constitutes a real challenging task for the Governments regarding their economic, social and political implications. Economically, removing subsidies of imported products means increasing the cost of intermediary inputs consumption for producers and increasing the prices of the final goods for households' consumption. This also means deteriorating the competitive advantage for domestic exporting firms from the producers' perspective. Socially, this has direct negative consequences on the households as it may erode their purchasing power and increases poverty and inequalities if such reforms have not been accompanied by policies mitigating these effects. Indeed, a recent study of the World Bank simulated that removing subsidies in Morocco, increases poverty by 4.4 percentage points, for an

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equivalent poverty line of US$ 1.44 per day, and the Gini inequality index by 2.1 percentage points (Verme et al., 2014). Politically, lobbies against removing subsidies, represented by political opposition parties and associations, are motivated by personal and group interests and play an aggressive role against any attempt of reforming subsidies. The presence of a strong government coalition and consensus building at the time of reform is a prerequisite condition for its success (Sdralevich et al., 2014).

The continuing increase of the cost of subsidized imported products in recent years due to soaring energy and food prices had push a big pressure on the Government to urge reforming such subsidies. The bill of subsidies has continuously increased from 1.3% as percent of GDP in 2002, to 6.7% of GDP in 2012. The main share is for petroleum products subsidy with DH48.2 billion (US$5.8 billion) representing 5.8% of GDP in 2012 (table 2). At the same time, the share of imported oil products increased from 0.4% in 1998 to 10.6% in 2012. Consequently, budget deficit including subsidies moved from -2.2% in 2009 to -7.3% in 2012. Without subsidies, this deficit was only about -0.4% in 2009 and reached 0.7% in 2012. In percent of expenditures, subsidies represented 25.4% of total expenditures in 2012 overcoming the capital expenditures, which represent around 24.6% of the total expenditures. The current account deficit stood at high records in 2012, with -9.7%. Consequently, international reserves are reduced to less than three months of imports in 2012 and the debt ratio increased as the country resort to external financing. Concerning these high weights of petroleum products and the instability of oil prices, the reform of such subsidies becomes an urgent and mandatory option for the Government.

The motivation of removing price subsidies is not only driven by the high burden cost that weighs on the Government budget, it is also argued that such system of subsidies does not benefit the poor but cover the rich, as well. In fact, many studies have shown that subsidies are pro-rich; approximately, the first quintile of the rich people benefits from the largest part of the total subsidies (Verme et al., 2014). For example, the poorest quintile benefits from diesel subsidies by only 1/6 the amount of the benefit of the richest quintile (7% for the poor versus 42% for the rich) (Sdralevich et al., 2014).

Recently, Morocco adopted a gradual approach as to the removal of subsidies especially petroleum products subsidies. Starting by the energy bill, a system of domestic prices indexation to international oil price was introduced in July 2013. In January 2014, the Government succeeded to remove the total subsidy for the "gasoline" product, followed by the removal of the total subsidy over the "diesel" product in January 2015. The subsidies of other oil products such as the industrial fuel have also been reduced but still not totally removed. This constitutes an important gain contributing mainly to the decline of the budget deficit from -7.3% in 2012 to around -5.4% in 2014.

The total removal subsidy of gasoline and diesel has coincided with a downward of oil prices starting on September 2014. This has to avoid the inflationary pressures that may arise due to the removal of subsidies. Nevertheless, the assessment of such pressures due to the increase of the cost of production should warn policy makers from the adverse effects of inflation generated by large swings of international oil prices. The recent history of inflation evolution in Morocco has shown very low stable prices around 1.73% as an average over the period of 1998-2013, that we could qualify by a great moderation inflation era in the country. It is the lowest inflation rate amongst the MENA region whether this is due to the central bank successful policy in controlling domestic prices or other factors[2].

Having said that, we use an input-output framework to analyze the pass-through effects of international oil prices to domestic prices as a result of removing subsidies in a small open oil importing developing economy, i.e. Morocco. This paper constitutes an added value to the empirical literature focusing on the inflationary pressures as a consequence of subsidy reform in an oil importing country in the MENA region.

In what follows, we present in section two, a brief literature review of the effects of subsidies on prices and welfare. The third section describes the Input-Output models methodology used to assess the effect of the removal of subsidies on prices for twenty producing sectors in Morocco, as well as data and figures about the important weight of such

[2] For details about this issue, an analysis is briefed in section 5: “Discussion of monetary policy implications”.

subsidies. The fourth section draws results and comments. The fifth one discusses the monetary and fiscal policy involvements and the sixth one concludes.

2. Review of Literature

The role of subsidies in the economy is unclear. From different views of many economists, subsidy system could disrupt producers and consumers prices and welfare. The subsequent section discusses the effects of subsidies and their removal on prices and welfare for a relatively small, open and net energy importing country; i.e., Morocco.

2.1 The impact of subsidies on prices and welfare

The major empirical studies and reports about subsidies are those of the IMF and the World Bank institutions. Canceling subsidies for an oil importing country means exposing local producers and consumers to the risks of prices instability for goods and services generated by international oil price variations. Many economists study the impacts of energy price swings. Examples of those are: Adjemian and Darracq Pariès (2008), Anand et al. (2013), De Gregorio et al. (2007), Elder and Serletis (2010), Finn (2000), Hamilton (1983, 2005), Hooker (2002), Hunt and Laxton (2001), Kilian (2008, 2014), OECD (2011), Peersman and Van Robays (2012), Tang et al. (2010), etc. On oil importing countries, the impacts vary across countries following the oil dependency of the economy, the degree of the development and the methodology of assessment. As example of a developed country for which the impacts were estimated, Hanson et al. (1993) analyzed the effects of international oil prices shocks on the agricultural sector in the United States, using input output and general equilibrium models. For a developing country, Lofgren (1995) used a CGE model for Egypt to analyze the short run effects of removing price-distorting subsidies for oil products traded locally and for other subsidized commodities. These effects are assessed to be negative on GDP, private income, consumption and employment while increasing government savings. As for the micro impacts, there was a reduction in oil use by 6 to 8 percent giving an additional push up to oil exports and reducing environment pollution. For the simulation of the consumer subsidy reduction of foodstuffs, this seems to be not very responsive due to low price and income elasticities for household food demand.

Recently, Coady et al. (2006) and Del Granado et al. (2010) used models based on input-output tables to assess the real income losses associated with reducing subsidies on fuel products. To assess the long run macroeconomic effects of subsidized energy products for a small, oil-importing developing country, Plante (2014) calibrated a general equilibrium model. The main conclusions are that, in the long run, the presence of subsidies increases the supply of hours worked and real wages leading to an over emphasis on traded goods while distorting the relative price of non-traded goods. By contrast, a general equilibrium simulation for Egypt economy involving 56 sectors with 11 energy sectors shows that energy subsidies shift resources from labor-intensive resources to capital-intensive resources leading to higher unemployment (World Bank, 2014). Accordingly, reducing subsidies in a similar economy should lead to higher labor and or wages especially in labor-intensive sectors promoting the overall employment.

Many studies and reports confirm the negative and direct role of the subsidies on the budget and the current account balance, threatening the sustainability of the public finances. The presence of subsidies also creates distortions on the economy and could increase inequalities. Especially, untargeted subsidies have tendency to favor a group of rich consumers over the poor, missing the target of protecting vulnerable people. About 1% in Egypt and Mauritania and less than 3% in Sudan (Sdralevich et al., 2014), and about 0.86% of diesel and gasoline in Morocco (Verme et al., 2014) are the shares of petroleum products subsidies consumed by the poorest 20% of the population. These figures show that energy subsidies do not benefit the poor.

The positive effects of the subsidies are assumed to benefit the final consumers through lowering prices of energy and food, and benefit the producers by reducing the cost of intermediate inputs. As a result, subsidies cushion the direct price increase effects of imported goods as well as the subsequent price increase generated by the cost of the imported inputs.

Despite the fact that energy subsidies are, effectively, pro-rich, their removal in the short term, could be highly felt by the vulnerable population, i.e. the middle and poor classes. The adverse effects are felt, for example, by the likely inflationary pressures due to price increase, resulting in income losses and other associated effects. The concerned

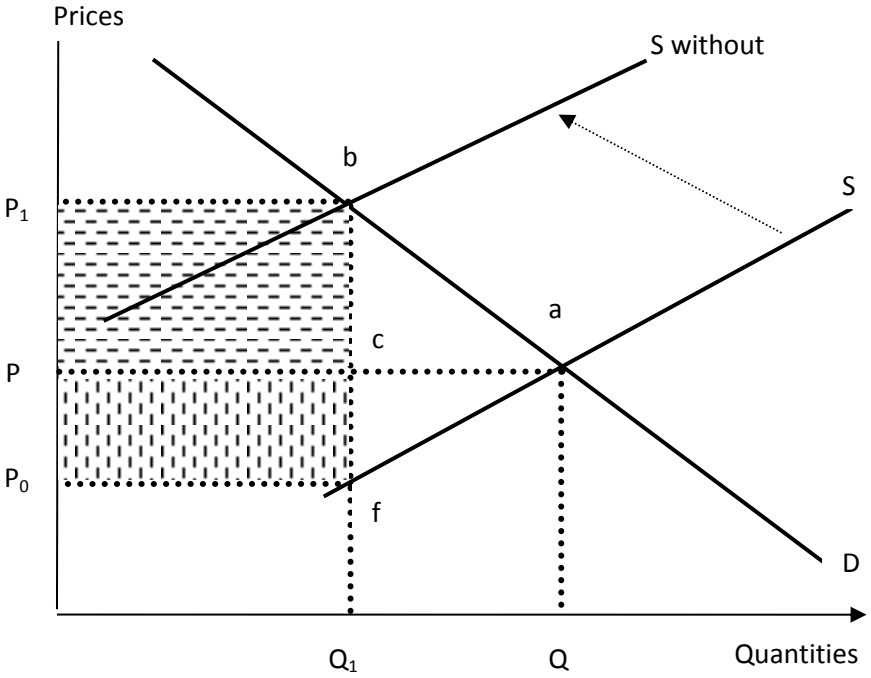
sectors are generally those of intensive using of petroleum products, such as transport, electricity and water production, food processing industries and manufacturing industries. The short run effects could be extended to medium and long terms effects via wages-prices spiral and due to subsequent higher expectations of future inflation. Furthermore, exporting sectors could see their foreign competitiveness threatened due to an increase in the production costs because of the removal of subsidies. This is why reforming subsidies is advisable to be gradual and accompanied by policies cushioning such negative externalities. Furthermore, removing subsidies could increase energy smuggling across neighboring countries, due to price differences between these countries (El-Katiri and Fattouh, 2015).

2.2. Pass-through of oil prices from producer prices to consumer prices

The prices effects of cancelling subsidies of oil products on the final consumers are of two origins: The first effect is when using these oil derivatives in their final consumption. Before removing subsidies, the price difference is supported by the government budget by compensating suppliers in charge of refining and distributing petroleum products. The second effect reflects the producers increased costs following the removal of subsidies on other products and services using oil products as inputs, such as transports, food and other manufacturing products. In the second case, both consumers and producers carry the charge of the price increase. The producers will try to pass on the maximum part they could of the increase to the consumers. However, this depends on the price elasticity of demand of the consumers to producers' products reflecting the responsiveness to prices increase. Figure 1 explains the situation where producers and consumers share the burden of removing subsidies.

We define P as the price by which the quantity Q is supplied before removing subsidies and P_1 and Q_1 respectively the new price and quantity supplied in the new situation of canceling oil subsidies. The reform shifts the supply curve (S) to the left, and the new supply curve (S without Subsidies) intersects with the demand curve (D) in the point (b) resulting in a higher price P_1 (reflected by the impact from international oil price increase) and lower quantity Q_1. We define P_0 as the price of the new quantity Q_1 if subsidies would have been kept.

Figure 1: Producer and consumer price changes and welfare after energy reform



For the new equilibrium "b"= (Q_1, P1), the load on the consumers is determined by the area $bcPP_1$ equal to $(P_1\text{-}P)*Q_1$, and the load on the producers is defined by the area $fcPP_0$ equal to $(P\text{-}P_0)*Q_1$. The division between consumers and producers depends on the price elasticity. The welfare gain for the government from this reform is reduced by the amount of tax base decrease due to the quantity reduction ($Q\text{-}Q_1$). See for example, Coady et al. (2015) for further explanation about fiscal and welfare gain from subsidy reform.

At the aggregate level, the point "a" is the equilibrium of the long run determined as the intersection between the aggregate demand and the aggregate supply. Once subsidies are removed, the new equilibrium is in "b" and is characterized as a short run equilibrium where prices are high and the aggregate output is reduced. This situation is called stagflation as a result of a coexistence of high inflation and output below its normal potential. If the aggregate demand stands stable, the return to the long run equilibrium in "a" could take place if salaries decreased, allowing

firms to reduce costs and re-expand the capacities. However, this equilibrium is not always immediately reachable by an automatic decrease of salaries driven by market forces. High commodity prices are likely to trigger a wage-price spiral, as labor unions will ask for higher salaries following a response to higher consumer prices. In developing economies, market competition is generally less intensive and labor unions less organized and less strong. This makes producers more likely to pass on increased costs to consumers by increasing prices. Thus, reform subsidies are more likely inflationary in developing than in developed countries. Other transitional effects could be the involvement of firms in efficient energy use and the shift from producing intensive labor goods towards intensive capital goods.

To sum up, many studies have revealed that oil shocks can cause inflation. Oil price increase combined with domestic energy prices deregulation will directly upraise the cost of production, especially across energy intensive sectors, disrupting firms from raising their investment capacities if not reduced. The higher cost of inputs will be passed on to consumer prices, increasing the headline consumer price index (CPI). The pass-through to the headline CPI, if oil prices were sustained, could be transmitted to the core inflation by raising inflation expectations especially if these expectations are not well anchored. The surge of inflation will reduce households' real income and consequently will reduce their consumption. This situation of high prices and disrupted production capacities results in higher unemployment and difficult policy implications.

3. Methodology and Data

3.1. Input-Output based model methodology

Based on Input-Output techniques, each economy is disaggregated into a number of sectors, n. In order to produce, each of the n sectors uses some or all different commodities produced by the other sectors as inputs including its proper commodity. The coefficients link the intermediate inputs used by others sectors represented by a $(n \times n)$ matrix, $A = (a_{ij})_n^n$, commonly called the technological matrix or technological coefficients of the entire economy. So, for a fixed i and j

, a_{ij} is the proportion of input i required to produce one unit of the good j.

Using the input output tables of a country, several simple formulae are developed to answer important questions such as; calculating inputs required for a given vector of final demands or, calculating final production for given available inputs or also assessing the impacts of an input or several inputs prices changes over the other inputs prices. The latter is known as the price input-output model. Noting $X=(n\times 1)$ a vector of total produced output by the n sectors of the economy and $D=(n\times 1)$ the vector of final demand, leads to:

$$X\text{-}AX = D \qquad (1)$$

Where AX is the part of the production served as input (intermediary consumption) and the left hand side is then, net production. Assuming that $(I\text{-}A)$ is a nonsingular matrix, the production vector is deducted as:

$$X = (I\text{-}A)^{-1} D \qquad (2)$$

For the price input-output model, we follow (Hanson et al., 1993). The derivation of change in unit costs, to measure direct and indirect cost linkages in an input-output model starts from the definition of cost prices:

$$P = A'P + VW \qquad (3)$$

Where, P is an n-element vector of sector prices, V is an n-element vector of value-added coefficients, W is an n-element vector of value added prices and A' is a transpose of the technological matrix A. Each sector output unit is allocated to purchase the intermediate inputs from other economic sectors ($A'P$) and the primary factors (VW) (wages).

Deriving the equation according to the price P yields:

$$dP = A'dP + VdW \qquad (4)$$

Rearranging the equation above yields:

$$dP = (I - A')^{-1}VdW \qquad (5)$$

In assessing the impact of price changes of sectors over other economic sectors, the nature of the impact differs whether the price of the studied sectors should be treated as exogenous or endogenous. For example, for many commodities, such as oil products, prices are internationally determined and are treated as exogenous for importing countries.

In practice, treating the k sectors, experiencing the price shock as exogenous, in the first step, is eliminating the k sectors from the structure of the production by removing their corresponding rows and columns from the technological matrix A. the second step is to include the removed rows of the direct requirements of the k exogenous sectors in the value added vector V. This allows the estimation of the effect of the prices shocks on cost prices of other sectors (or sectors' prices if all the higher costs are passed on to buyers). The reduced technological matrix is of dimension $(n-k)$ by $(n-k)$ and V is now a $(n-k)$ by $(1+k)$ matrix. Assessment of the exogenous price shocks effects is deduced by applying the precedent formula (5) to the new matrices.

3.2. Data and subsidy burden in the economy

Morocco published input-output tables for the period 1998-2013, issued by the High Commission for Planning[3]. The data are disaggregated into 20 economic sectors. The definitions and codes of these sectors are presented along with the weight of each sector in table 1. The weight for each sector is defined as its total use of all products inputs to the all inputs used by the economy to produce the whole output. Table 1 presents also the refined oil and other related products intensiveness of the 20 sectors of the Moroccan economy. We choose to present data for three input-output tables by selecting three years, where oil prices are low (1998), medium (2005) and high (2012). The intensiveness in oil products, for each sector, is defined as the intermediary consumption of refined oil divided by the total inputs used by that sector in the process of production.

[3] http://www.hcp.ma/downloads/Comptabilite-nationale_t11873.html

The most intensive oil sectors are fishing and aquaculture, transports, electricity and water, mining industries, other manufacturing industries and trade and repairing. Taking the weights into accounts, which are varying between the three years, the most consuming sectors in refined oil products are transportation, mining industries, manufacturing industries, electricity, and water production sectors, with differences between 1998, 2005 and 2012, due to the weights variation.

Table 1: Oil intensiveness, sectors' weights and weighted intensity in percent (%)

			1998			2005			2012		
Rank	Code	Economic sectors	Oil intensity[i]	Sectors' weight[ii]	Weighted intensity[iii]	Oil intensity[i]	Sectors' weight[ii]	Weighted intensity[iii]	Oil intensity[i]	Sectors' weight[ii]	Weighted intensity[iii]
1	A00	Agriculture, hunting, & related services	4.4	18.5	0.8	7.7	14.9	1.1	8.2	9.8	0.8
2	B05	Fishing and aquaculture	35.0	0.8	0.3	47.9	0.9	0.4	49.1	0.8	0.4
3	C00	Mining Industry	19.0	5.5	1.0	31.4	9.0	2.8	31.7	3.5	1.1
4	D01	Food Industry and Tobacco	1.5	7.4	0.1	2.8	6.4	0.2	3.0	9.7	0.3
5	D02	Textile industry and cook	1.2	7.9	0.1	2.3	6.0	0.1	2.9	3.7	0.1
6	D03	Chemical industry and para	1.8	7.2	0.1	3.6	5.9	0.2	3.2	3.7	0.1
7	D04	Mechanical, electric & metal industries	1.4	12.8	0.2	2.7	13.6	0.4	2.8	5.3	0.2
8	D05	Other manufacturing industries	10.1	11.1	1.1	18.0	10.2	1.8	20.3	3.7	0.7
9	D06	Oil refining and others	0.1	5.4	0.0	0.0	8.2	0.0	0.1	4.0	0.0
10	E00	Electricity and water	30.4	3.6	1.1	24.6	3.2	0.8	24.0	2.3	0.6
11	F45	Building and public works	4.4	0.2	0.0	5.9	0.3	0.0	6.9	9.0	0.6
12	G00	Trade and repairing	10.9	0.9	0.1	17.2	0.9	0.2	18.8	8.1	1.5
13	H55	Hotels and restaurants	1.1	0.6	0.0	2.1	0.9	0.0	2.2	2.3	0.1
14	I01	Transportation	29.2	1.9	0.6	38.7	2.2	0.8	43.7	4.7	2.1
15	I02	Post and telecommunications	3.6	1.3	0.0	5.1	1.1	0.1	5.8	2.4	0.1
16	J00	Financial activities and insurance	0.0	7.6	0.0	0.0	8.1	0.0	0.0	4.5	0.0
17	K00	Real estate, rental & services to enterprise	3.1	6.5	0.2	5.8	7.5	0.4	5.3	7.7	0.4
18	L75	General public administration & security	14.6	0.0	0.0	12.7	0.0	0.0	13.3	7.6	1.0
19	MNO	Education, health and social work	3.4	0.1	0.0	4.0	0.1	0.0	4.5	6.2	0.3
20	OP0	Other non financial services	2.9	0.5	0.0	6.4	0.5	0.0	7.4	0.9	0.1
		Total		100.0	5.8		100.0	9.5		100.0	10.4

Source: Author's calculation from the input-output tables for the Moroccan Economy for the years 1998, 2005 and 2012.

i: The oil intensity or intensiveness is the quantity of refined oil used as input among other inputs.

ii: The weight for each sector is defined as its total use of all products inputs to the all inputs used by the economy to produce the whole output. Following the same notations in section 3, we formulate the weight W_i for each sector i as: $Wi=\left(\sum_{j=1}^{n} A_{ij}\right) \Big/ \left(\sum_{i=1}^{n}\sum_{j=1}^{n} A_{ij}\right)$.

iii: weighted intensity is the oil intensiveness taking into account the weight of the sector in the economy in terms of using inputs. It is the results of the oil intensity multiplied by the weight: $WI_i = OI_i \times W_i$.

Table 2 summarizes some interesting facts about the food and energy subsidies trends in Morocco as well as the associated imports of energy products and oil prices. The first part of the table shows the total subsidies, which was about DH5.835 billion in 1998, representing 1.5% of total GDP, 5.4% of total imports and about 9.1% of government expenditures. These figures moved up following an ascending trend of international commodities prices (oil and food prices), recording more than DH55.6 billion in 2012; which is equivalent to 6.7% of GDP, 13.4% of total imports and 34.9% of total government consumption. By category of subsidies products, the second and the third parts of the table 2, show the importance and the evolution of food and energy products subsidies in the economy. We observe that the trends of shares in total subsidies and in GDP are reversed, by time, between the two principal categories of subsidized products; food versus energy products. Food subsidy, which was about 90% of total subsidies in 1998, decreased to around 13% in 2012 and 15% in 2013. Their level grows by only 1.2% on geometrical average over the past fifteen years while the total subsidy grows by 17% over 1998-2012. This huge growth is dragged by the energy subsidy that grows at an annual geometric rate of 38% following a high-recorded oil prices especially in 2011, 2012 and 2013. The oil imports have considerably increased as a share of GDP from 0.6% in 1998 to 7.4% in 2012 following a sustained increasing trend in oil prices over this period. The important increasing of the bill energy compared to the food and the sensitivity of vulnerable population to the food subsidy are the principal reasons behind starting with reforming energy subsidies first.

Table 2: Evolution of subsidies in levels and its shares in percent of main economic aggregates

	Total subsidies				**Food products subsidies**			**Energy products subsidies**			**Oil imports**	**Oil Prices (Brent, Europe)**
years	Millions of Dh	% of GDP	% of Imports	% of government consumption	Millions of Dh	% of total	% of GDP	Millions of Dh	% of total	% of GDP	% of GDP	U.S. $ per barrel
1998	5,835	1.5	5.4	9.1	5,306	90.9	1.4	529	9.1	0.1	0.6	12.8
1999	6,376	1.6	5.5	9.1	5,456	85.6	1.4	920	14.4	0.2	0.7	17.9
2000	7,995	2.0	6.1	11.1	5,506	68.9	1.4	2,489	31.1	0.6	1.3	28.7
2001	6,377	1.5	4.7	8.0	3,767	59.1	0.9	2,610	40.9	0.6	1.3	24.5
2002	5,665	1.3	3.9	7.0	3,593	63.4	0.8	2,072	36.6	0.5	1.3	25.0
2003	6,347	1.3	4.2	7.3	3,977	62.7	0.8	2,370	37.3	0.5	2.3	28.9
2004	8,329	1.6	4.8	8.8	3,742	44.9	0.7	4,587	55.1	0.9	1.9	38.3
2005	11,269	2.1	5.6	11.0	3,806	33.8	0.7	7,463	66.2	1.4	2.4	54.6
2006	13,143	2.3	5.7	12.3	5,443	41.4	0.9	7,700	58.6	1.3	2.9	65.2
2007	16,150	2.6	5.8	14.4	5,469	33.9	0.9	10,681	66.1	1.7	3.6	72.4
2008	16,150	2.3	4.6	13.7	5,469	33.9	0.8	10,681	66.1	1.6	4.8	96.9
2009	12,788	1.7	4.4	9.6	3,488	27.3	0.5	9,300	72.7	1.3	3.9	61.7
2010	30,198	4.0	9.2	22.5	4,883	16.2	0.6	25,315	83.8	3.3	5.0	79.6
2011	51,197	6.4	13.1	35.0	6,859	13.4	0.9	44,338	86.6	5.5	6.7	111.3
2012	55,604	6.7	13.4	34.9	7,368	13.3	0.9	48,236	86.7	5.8	7.4	111.6
2013	41,600	4.8	10.2	25.1	6,330	15.2	0.7	35,270	84.8	4.0	6.6	108.6

Sources: Author's calculation from Input-Output tables, and the International Energy Agency website for oil prices.

The subsidy reduction policy has started in July 2013, allowing for reducing the subsidies recorded in 2012 by about DH13 billion (US$1.6 billion) representing 2.1 percentage of GDP. The year 2015 is expected to witness a reduction in the energy subsidies of more than 80%. This percentage reflects approximately the share in the total energy products of the gasoline and diesel products which have been totally unsubsidized starting from January 2015, as well as, and other fuel products partially liberalized.

4. Results and Comments

Morocco imports all its energy products from which the major share is crude oil. The country is supplied by the domestic refinery, SAMIR[4] with a refining capacity of 150,000 barrel/day, and a storage capacity of 2 million m^3. Therefore, international prices are directly reflected in the cost of production before tax and subsidies.

4.1 Treating oil sector as endogenous

We consider three scenarios for the rise of oil prices from their observed levels as baseline scenarios by respectively 25%, 50% and 75%. Regarding the tendency of the asymmetry found in most of the empirical literature[5], we couldn't expect any results for the oil price decrease. Assuming that removing subsidies is equivalent, in an oil importing country, to exposing the domestic producers and consumers of energy to direct impact of international prices, we translate the three previous scenarios of oil changes as changes in the proportions of refined oil sector (sector 9, table 1) used by other sectors. The assessment is, therefore, to increase the intermediary consumption of other sectors in terms of oil products, and applying the formula (5) (section 3.1) to study the impacts. We consider the oil sector as endogenous at this level.

Assuming that the input-output tables' structure linkages could change over time leading to instable coefficients and multipliers, we choose to assess the scenarios effects considering three input-output matrices: the

[4] http://www.samir.ma/index.php?option=com_content&view=article&id=2&Itemid=104

[5] See for example (Borenstein *et al.* 1997) and (Kristoufek and Lunackova, 2015) for a survey of the articles on the asymmetry subject.

first of the period is the table for the year 1998, the middle is for 2005 and the last of the period is for 2012. The properties of the selected matrices correspond to three different levels of actual recorded oil prices: low level in 1998 (12.8 US$ per barrel), medium level in 2005 (54.6 US$ per barrel) and high level in 2012 (111.6 US$ per barrel). This allows diversifying scenarios results under different actual prices.

Table 3 presents the results for the studied scenarios for the three matrices. The first results show that in the absence of subsidies, international oil prices affect the most intensive sectors in oil products such as transportation services, electricity and water production, industries such as food processing, manufacturing and mining sectors. For example, transport prices have increased by around 10% in 1998 and 22% in 2005 and 2012 following a scenario of an increase in oil prices by 75%.

We also show that, the effects are more pronounced in recent economic structure (2005 and 2012) than in fifteen years ago (1998). This could be a mixed effect of low level of actual oil prices in 1998, as well as the difference of structures of the productions (weights of sectors in term of total inputs use and intensiveness of energy use). Furthermore, observed linear movements of effects between the three scenarios are automatic due to the linear form of the input-output models.

Table 3: Scenarios effects of oil price increases by respectively 25%, 50% and 75% on the structure of production inputs of 1998, 2005 and 2012.

		Effects on the structure of 1998 (%)			**Effects on the structure of 2005 (%)**			**Effects on the structure of 2012 (%)**		
		Increases by			**Increases by (%)**			**Increases by (%)**		
Rank	Economic sectors	25%	50%	75%	25%	50%	75%	25	50	75
1	Agriculture, hunting, and related services	0.6	1.2	1.8	1.2	2.5	4.0	0.8	1.5	2.3
2	Fishing and aquaculture	3.0	6.1	9.3	4.0	8.2	12.9	3.4	7.0	10.6
3	Mining Industry	2.3	4.6	7.1	4.4	9.1	14.3	1.7	3.5	5.4
4	Food Industry and Tobacco	1.1	2.2	3.3	2.0	4.2	6.5	1.6	3.2	4.9
5	Textile industry and cook	0.9	1.8	2.8	1.7	3.4	5.4	1.6	3.2	4.9
6	Chemical industry and para	1.4	2.9	4.5	2.6	5.3	8.4	1.3	2.7	4.1
7	Mechanical, electric and metal industries	1.2	2.4	3.6	2.1	4.4	6.8	1.9	3.9	5.9
8	Other manufacturing industries	2.8	5.7	8.7	4.9	10.3	16.1	4.8	9.9	15.0
9	Oil refining and others	1.7	3.4	5.3	4.0	8.4	13.2	1.7	3.5	5.3
10	Electricity and water	2.6	5.4	8.2	3.4	7.0	11.0	2.9	5.9	9.1
11	Building and public works	2.0	4.1	6.3	2.9	5.9	9.3	2.8	5.7	8.7
12	Trade and repairing	1.1	2.2	3.3	2.0	4.2	6.6	1.9	4.0	6.0
13	Hotels and restaurants	0.6	1.3	2.0	1.0	2.1	3.3	0.8	1.6	2.5
14	Transportation	3.3	6.8	10.4	6.8	14.3	22.3	7.1	14.4	22.0
15	Post and telecommunications	0.2	0.5	0.7	0.9	1.9	3.0	1.1	2.3	3.5
16	Financial activities and insurance	0.1	0.3	0.4	0.2	0.4	0.7	0.2	0.5	0.7
17	Real estate, rental and services to enterprises	0.1	0.2	0.3	0.2	0.4	0.6	0.1	0.3	0.4
18	General public administration and security	1.4	2.9	4.5	1.6	3.3	5.2	1.4	2.9	4.4
19	Education, health and social work	0.2	0.4	0.6	0.2	0.4	0.7	0.1	0.3	0.4
20	Other non-financial services	0.3	0.7	1.0	0.4	0.9	1.5	0.4	0.8	1.2

4.2. Results for exogenous oil sector

In the previous results, we count for oil refining sector as endogenous. However, it is more suitable to consider oil swings as foreign shocks for an oil importing country. We, therefore consider the oil sector exogenous, following the approach of Hanson et al. (1993).

Using this approach, we produce three scenarios of increase effects and, for the two matrices of 2005 and 2012. The prices changes are quite reduced compared to the situation where we considered the oil sector as endogenous (Table 3). To deduce the overall increasing inputs cost, we account for the weight of each sector in the total economy in terms of intermediary consumption. The contribution of each sector to the overall cost increase is its price change multiplied by the corresponding weight. The overall increase is then a sum of the all sectors' contributions; a weighted sum of the 19 sectors' prices change excluding the oil sector as it is exogenous. The results, presented in Table 4, are sorted from largest to smallest sector's change based on 2012 results. For a scenario of 75% of oil price increase, the most affected sectors are transportation by 19.6% (1% as contribution), other manufacturing industries by 13.4%, fishing and aquaculture by 9.5% and electricity and water by 8.1. Furthermore, weights, as for oil intensiveness, play an important role in contributing to the overall production cost. For example, in 2012, fishing and aquaculture sector which have the highest oil intensity of 49.1% is the least weighted sector by 0.8% (Table 1) making its contribution to the overall cost increase insignificant (0.1%).

Table 4: Prices change of the inputs production structures of 2005 and 2012, following exogenous shocks on the refined oil sector by respectively 25%, 50% and 75%.

		Effects of oil price increase on 2005 inputs structure							**Effects of oil price increases on 2012 inputs structure**						
		25	50	75	Weight[i] %	25	50	75	25	50	75[ii]	Weight[i] %	25	50	75
	Economic sectors	Scenarios effects (%)				Weighted effects (%)			Scenarios effects (%)				Weighted effects (%)		
14	Transportation	5.7	11.4	17.1	2.4	0.1	0.3	0.4	6.5	13.1	19.6	4.9	0.3	0.6	1
8	Other manufacturing industries	4.1	8.2	12.3	11.1	0.5	0.9	1.4	4.5	8.9	13.4	3.8	0.2	0.3	0.5
2	Fishing and aquaculture	3.3	6.6	9.9	1	0	0.1	0.1	3.2	6.3	9.5	0.8	0	0.1	0.1
10	Electricity and water	2.8	5.6	8.4	3.5	0.1	0.2	0.3	2.7	5.4	8.1	2.4	0.1	0.1	0.2
11	Building and public works	2.4	4.7	7.1	0.3	0	0	0	2.6	5.2	7.8	9.4	0.2	0.5	0.7
12	Trade and repairing	1.7	3.4	5.1	1	0	0	0.1	1.8	3.6	5.4	8.4	0.2	0.3	0.5
7	Mecanical, electric and metalurgical industries	1.7	3.5	5.2	14.8	0.3	0.5	0.8	1.8	3.5	5.3	5.5	0.1	0.2	0.3
3	Mining Industry	3.6	7.3	10.9	9.8	0.4	0.7	1.1	1.6	3.2	4.8	3.7	0.1	0.1	0.2
4	Food Industry and Tobacco	1.7	3.3	5	7	0.1	0.2	0.4	1.5	2.9	4.4	10.1	0.1	0.3	0.4
5	Textile industry and cook	1.4	2.7	4.1	6.6	0.1	0.2	0.3	1.4	2.9	4.3	3.8	0.1	0.1	0.2
18	General public administration and security	1.3	2.7	4	0	0	0	0	1.3	2.6	3.9	7.9	0.1	0.2	0.3
6	Chemical industry and para	2.1	4.3	6.4	6.4	0.1	0.3	0.4	1.2	2.4	3.6	3.9	0	0.1	0.1
15	Post and telecommunications	0.8	1.5	2.3	1.2	0	0	0	1	2.1	3.1	2.5	0	0.1	0.1
13	Hotels and restaurants	0.8	1.7	2.5	1	0	0	0	0.7	1.5	2.2	2.4	0	0	0.1
1	Agriculture, hunting, and related services	1	2	3	16.2	0.2	0.3	0.5	0.7	1.4	2.1	10.2	0.1	0.1	0.2
20	Other non-financial services	0.4	0.7	1.1	0.5	0	0	0	0.3	0.7	1	1	0	0	0
16	Financial activities and insurance	0.2	0.3	0.5	8.9	0	0	0	0.2	0.4	0.6	4.7	0	0	0
19	Education, health and social work	0.2	0.3	0.5	0.1	0	0	0	0.1	0.3	0.4	6.5	0	0	0
17	Real estate, rental and services to enterprises	0.2	0.3	0.5	8.2	0	0	0	0.1	0.2	0.3	8	0	0	0
	Total Weighted Inflation (oil sector exogenous)				100.0	1.9	3.8	5.7				100.0	1.6	3.3	4.9
	Total Weighted Inflation (oil sector endogenous)					2.4	5.1	8.0					1.8	3.6	5.5

i: Weights in table 4 are a little different from those presented for 2005 and 2012 in table 1, as they are newly calculated to adjust for only 19 sectors after the withdrawal of oil sector considered as exogenous in this table.

ii: All the data in the table are sorted from largest to smallest according to the column reporting the effects of oil price increase by 75%.

5. Monetary and Fiscal Policy Involvement

In September 2014, oil prices have started to decline from their high levels above 100 US$ and reached the level of 50 US$ at the beginning of the year 2015. This constitutes a huge decrease of more than 50% in just a quarter of year. In the beginning of 2016, the prices decreased to around 30 US$. This constitutes a huge decrease of more than 70%. The decrease is a consequence of supply and demand shocks. Form a supply side, United States production capacities augmented. From a demand side, world growth is expected to slow in 2015. The recent oil prices downward trend coincides with the total removal of subsidies over gasoline and diesel products in Morocco. This avoided to the economy, the inflationary pressures that could have occurred had the oil prices continued with their high levels of 2013.

5.1 Economic policies and inflation trend in Morocco

By the expected back of oil prices increase, inflationary pressures will arise which could threaten the "great moderation era" of Morocco. Indeed, the country has enjoyed low stable inflation rates over the period 1996-2014. The average inflation rate over this period is 1.7% bounded with a minimum of 0.6% in 2001 and a maximum of 3.9% recorded in 2008. It is the best stable inflation path in the MENA region in terms of average and variability (table 5). The important questions that remain are: what has to be done, henceforth, to cushion the inflationary effects? Does the Central Bank in its current status armed to control such additional cost inflation?

Table 5: Inflation rates distribution over the period 1996-2014 for the Middle East and North African Countries.

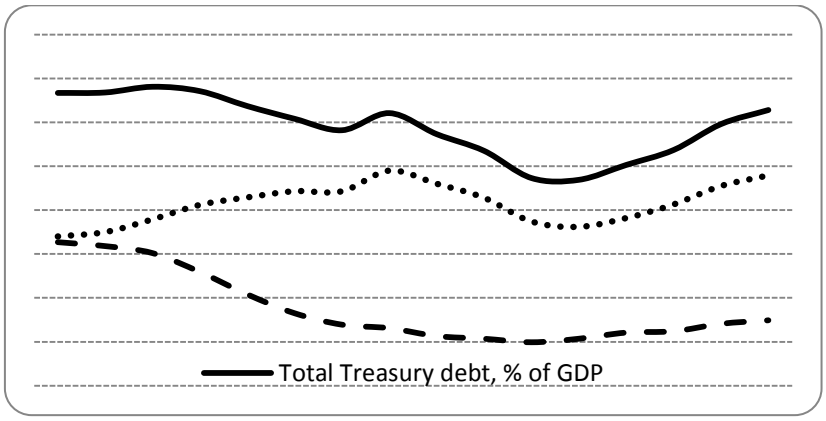
	Mean	STDEV	Minimum	Maximum	Range
Morocco	1.73	0.97	0.61	3.89	3.28
Tunisia	3.67	1.24	1.44	6.11	4.66
Kuwait	2.92	1.73	0.60	6.30	5.70
Bahrain	1.51	1.84	-1.26	4.60	5.86
Saudi Arabia	1.61	2.35	-2.08	6.10	8.18
Mauritania	5.70	2.49	2.14	12.13	9.99
Djibouti	3.20	2.51	-0.40	11.96	12.36
Jordan	3.83	3.14	-0.67	13.94	14.62
Oman	2.16	3.15	-1.20	12.56	13.76
Lebanon	3.74	3.34	-0.72	10.76	11.48
United Arab Emirates	3.76	3.50	0.67	12.25	11.59
Algeria	4.62	3.90	0.30	18.70	18.40
Pakistan	8.34	3.90	2.43	17.63	15.20
Egypt	7.32	4.09	0.00	16.24	16.24
Syria	4.00	5.18	-3.90	15.15	19.05
Qatar	4.20	5.21	-4.95	15.20	20.15
Libya	2.45	5.84	-9.86	15.90	25.77
Iran	18.17	6.67	10.35	34.70	24.35
Yemen	12.27	7.46	3.68	38.79	35.11
Afghanistan	10.06	9.16	-6.81	26.42	33.23
Iraq	14.22	18.97	-2.19	53.25	55.44
Sudan	23.18	29.35	4.87	132.82	127.95

Source: Calculated from, IMF World Economic Outlook Database, October 2014. Data are sorted from smallest to largest according to Standard deviation column (STDEV)

Generally, some believe that the great moderation era is not due only to the success and achievements of the Central Banks; it is rather import prices and wages moderation (Perry and Cline, 2013). In Morocco, this performance is seen by some as a forced stability at the expense of sustainable growth and full employment promotion (Taouil, 2010). The monetary policy and the fiscal policy altogether have contributed to insufficient growth and low level of employment achievements. The country maintains an average growth rate of 4.5 percent over the last two decades. This is judged insufficient to absorb radically high unemployment rates and alleviate poverty (World Bank, 1995; 2006). Despite a downward trend, the unemployment rate still stand at around 10 percent.

The insufficient achievements of both monetary policy and fiscal policy sounds, to some extent, arguable if we examine some monetary aggregates, such as, the public debt and the lending interest rate. The composition of the public debt and its trend are characterized over the period 1998-2010 by a growing share of debt acquired from the domestic market and a decreasing share of the public foreign debt as described in Figure 2. This gives a signal of a constriction of the credit market by the Government.

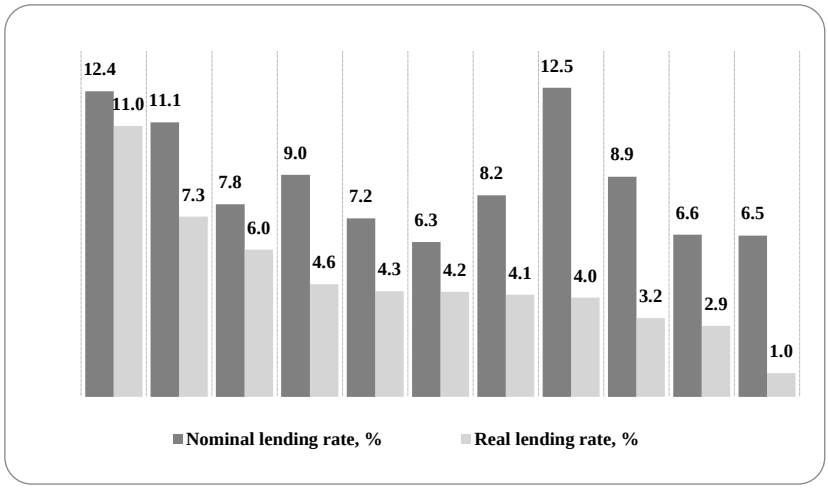
Figure 2: The evolution of treasury debt in Morocco, as percent of GDP.



Source: Data are from The Ministry of Economy and Finance, Morocco (http://www.finances.gov.ma/fr/Pages/Statistiques.aspx)

As for the real lending rate, the real cost by which the private sector is financed from the banking sector, it is the among highest in the MENA region, despite an opposite low level of Central Bank policy rate compared to the MENA region (Figure 3). This constitutes a brake on the demand and access to credit especially for SMEs, which affects the growth and thus reduces inflation by demand shocks. The classic response to the positive demand shocks that increases the inflation and output is tightening the monetary policy. However, for a foreign positive price shock, the implications are only inflationary and their effects are negative on output making the task not straightforward for the Central Bank (De Gregorio, 2012).

Figure 3: Average nominal and real lending rates over the period 2001-2013 for selected MENA countries (%)



Source: Constructed by the author from World Development Indicators database, the World Bank.

The fiscal policy have also played an important role by subsidies, as proven in this paper, in cushioning the effects of high prices of imported energy and food products. Consequently, the low level of inflation and its stability in Morocco could not be solely the merit of the monetary policy.

5.2. Discussion of the pass-through from headline to core inflation

Inflation is by definition a sustainable increase in the general level of prices. Starting from this point, could we argue that removing subsidies is by nature inflationary process? Especially that Central Banks target core inflation calculated removing volatile products such as energy and food products? What factors could ease the pass-through to core inflation?

Central Banks mostly focus on core inflation instead of headline inflation. In calculating core inflation, Central Banks excludes food and energy prices from calculations, as they consider that their prices changes are mainly driven by short-term fluctuations generally in supply side and could not fuel the formation of economic agents' expectations

affecting the general level of prices in the long run. However, if such short run fluctuations became sustained, which was the case in different past periods (2002-2008, for example), these variations are most likely to increase core inflation by affecting the expectations of inflation. The way the commodity prices affect core inflation, even if it is different from driven demand inflation way, is likely to generate a threatening inflation for policy makers.

The pass-through of particularly energy prices to the core inflation depends on several factors. The first one is the energy intensity of the economy, which is the weight of energy use in the economic production process as well as consumption patterns. The second factor is the degree of influence of intensive energy sectors on other non-energy sectors. The third factor is the structure of the economy reflecting its development and the efficiency in energy use. The fourth factor is the local currency stability path against the dollar, which is reflected by the management of the exchange rate regime. Finally, the pass-through intensity depends also on the credibility of the Central Banks vis-à-vis the economic agents and its ability to well anchor inflation expectations.

In developed countries where monetary policy is judged to be more credible, and the pass-through to core inflation is not well pronounced especially for short lived oil shocks (Hooker, 2002), the delay in responding to more sustained oil price increase could threaten such credibility and results in costly macroeconomic impacts (Hunt et al., 2001). In developing oil-importing countries, the pass-through of international oil prices to core inflation seems to be more felt due to less anchored inflation expectations. Mandal et al. (2012) found such pass-through to be very important in India. Furthermore, the pass-through is higher whenever energy products prices are totally deregulated. If oil prices and related products are totally subsidized, the pass-through from international prices to local prices is likely to be dampened (Jongwanich and Park, 2011). Hence, the core inflation will be immune from any changes in international oil prices unless there are expectations of future reforms on the way to liberalize prices.

The monetary policy automatic response to the raise of inflation is a restrictive policy. However, this response is not always suitable for every situation. It should take into account, the regime of the exchange rate, the nature of inflation; inflation cost push or demand push inflation,

the level of the unemployment in the economy. Monetary policy options for stabilizing oil price shocks are presented in Blanchard and Galí (2007).

The monetary policy in Morocco has no direct control over domestic prices as it targets the overnight market rate to maintain a fixed exchange rate and capital controls. Indeed, Morocco has a conventional peg arrangement of its currency to a basket of currencies comprising the euro and the U.S. dollar, with respective weights of 80 and 20 percent (IMF, 2011; 2014). The recent Euro depreciation against the dollar pushed the authorities revising these weights to be 60 and 40 percent, for respectively the Euro and the U.S. dollar in April 2015.

In recent years, the oil price shocks have tendency to be sustained in the long run. The oil price have shown a long tendency over the last period decade 2002-2012, with a yearly average evolution of 16.2%; from 25$ per barrel to around 112$ per barrel. Even though energy and food products are subsidized, the pass-through from international commodity prices to the domestic prices was important. Furthermore, the pass-through of international food prices for example, was important in developing countries compared to developed countries due to the important weights of such products in the consumer basket (WEO, 2011, chapter 3). The removal of subsidies will cause a push cost inflation, which passes on directly to the consumer prices.

6. Conclusion and Policy Implications

The important results of this paper are that the fiscal policy, by the presence of subsidies, among other factors of its action, plays a major role in bringing down inflation. We show that canceling energy subsidies constitutes an additional inflation that should be put under control by the monetary authorities. However, the domestic prices escape to direct control in a fixed exchange regime as the Central Bank targets foreign prices; i.e. the exchange rate. The Central Bank of Morocco should adopt a more flexible framework to cushion foreign inflationary shocks without impairing competitiveness (IMF, 2011). The reform of subsidies should accelerate the current debate about the Moroccan exchange rate regime and the inflation-targeting regime. We join the views of many experts to emphasize recommending targeting domestic prices and free the exchange rate as reforms accelerate and the

economy becomes more financially integrated. The current depreciation of the euro versus the dollar to its lowest level for more than 10 years ago, push towards such reform; keeping the current pegged exchange rate to the basket of Euro and Dollar will further depreciate the dirham against the Dollar leading to an increase in the debt level labeled in dollar and increase the import bill.

Finally, by succeeding to control the inflation, the overall economy will benefit from the reform of energy subsidies. Besides the reduction of the twin deficits (budget and current account deficits) and the positive effects of their macroeconomic implications, removing price subsidies is expected to serve the assumed principal social goal of their creation at the beginning; that is, among others, protecting the population from high prices. The saved budget from the reform should be targeted towards social investments and fragile population to reduce poverty and inequality. Furthermore, structural transformation in the economy could happen and resources will shift from capital-intensive sectors to labor-intensive sectors leading to reduced unemployment rate.

Encouraged by the World Bank and the IMF, the energy reform in Morocco has passed a big step by liberalizing more than 80% of energy prices. Despite that, the reform coincides with the descending trend of oil prices, it is expected that low oil prices may not last and may increase in the long run. Under these expected circumstances, we simulated three gradual scenarios of 25%, 50% and 75% increases in international oil prices taking into account the recent production structures of the economy in 2005 and 2012. We showed that this could generate an overall additional cost increase of respectively, 1.8% to 2.4% for the first scenario, 3.6% to 5.1% for the second and 5.5% to 8% for the last scenario. This raise is mainly dragged by leading sectors intensive in oil products such as transports, electricity and water production, food processing and manufacturing industries.

We also used different input output matrices of years where actual oil prices are low (1998), medium (2005) and high (2012) and sectors inputs weights are variable. This allows assessing the effects assuming the inputs coefficients instability. The results show substantial differences between the three matrices especially between 1998 matrix and the two others. We also discussed the policy implications of the increased inputs cost on inflation and the response of the monetary

policy for a combined situation of sustained oil price increase (whenever the prices starts to rise from their current low levels) and the absence of energy subsidies.

Aknowledgement

I would like to express my deep gratitude to Professors; Ahmed Al kawaz and Weshah Razzak for their valuable comments on the earlier version.

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