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On the removal of energy products subsidies in an importing oil country: impacts on prices in Morocco.

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Abstract

Using input-output models, we analyze the effect of removing subsidized oil products in Morocco. We set three scenarios of increasing oil products by 25%, 50% and 75%, and symmetric decreases by the same amounts. We show that the effects are high in intensive oil products sectors such as transports and electricity and water sectors. Using the weights of the sectors, we deduce the overall inflation generated by direct and indirect requirements for the total economy. For example, an increase in oil prices by 75% generates a global inflation cost between 5.5% and 8%. Symmetric scenarios indicate no strong asymmetrical effects. The generated 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 managed exchange rate regime towards a flexible regime, extensively discussed, is now an urgent necessity.

JEL Codes: D57, E31, Q41

Keywords: Energy Reform, Fiscal Policy, Inflation, Input-Output Models, Asymmetric Effects, Morocco.

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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 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 8.1% of GDP in 2012. The important share is for petroleum products subsidy with DH48.2 billion (US$5.8 billion) representing 7% of GDP in 2012. At the same time, the share of imported oil products increases 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 is only about -0.4% in 2009 and reaches 0.7% in 2012. 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 and the debt ratio increased as the country resort to external financing. With regards to these high weights of petroleum products and the instability of oil prices, the reform of such subsidies becomes an urgent necessity for the Government.

The motivation of removing prices 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 to the poor compared to the rich population. 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 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[1]. 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 such as Morocco. This paper constitutes an added value to the so limited empirical literature focusing on the inflationary pressures as a consequence of subsidy reform in a net oil importing country in the MENA region.

In what follows, we present 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 20 producing sectors and the overall inflation in Morocco. Data, facts and figures about the important weight of such subsidies are shown in the fourth section. The fifth section draws results and comments, while the sixth one discusses possible policy actions and concludes.

2. Literature review on the economy of subsidies: impacts on prices

The role of subsidies in the economy is fuzzy. From different views of many economists, subsidy system could disrupt producers' prices. The subsequent

[1] For details about this issue, an analysis is briefed in the "conclusion and policy discussion" section.

section discusses the effects of subsidies and their removal on prices for a relatively small, open and net energy importing country such as Morocco.

The literature developments about subsidies effects are relatively minor. 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 prices inflation of goods and services generated by international oil price increases. The impact of energy prices swings are studied by many economists. For example, Hanson et al. (1993) analyses the effects of international oil prices shocks on the agricultural sector using input output models and general equilibrium models. On the same way, Coady et al. (2006) and Del Granado et al. (2010) use models based on input-output tables to assess the real income losses associated with reducing subsidies on fuel products. To assess the macroeconomic long run 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 (the World Bank, 2014) shows that energy subsidies shift resources from labor intensive resources to capital intensive resources leading to higher unemployment.

Thus reducing subsidies should lead to higher labor and or wages especially in labor intensive sectors promoting the overall employment.

A lot of studies and reports confirm the negative role of the subsidies directly on the budget and the current account balance, threatening the sustainability of the public finances. Their presence also creates distortions on the economy and could increase inequalities. The positive sides of the subsidies are assumed to benefit to final consumers through lowering prices of energy and food and to producers by reducing the cost of intermediate inputs. As a result, subsidies cushion the effects of imported inflation and the additional subsequent inflation generated by the cost of the imported inputs. However, untargeted subsidies have tendency to favor a group of rich consumers over the poor missing the goal 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 to the poor.

Despite the fact that energy subsidies are pro-rich, the adverse effects, in the short term, of their removal could be highly felt by the vulnerable population and the medium classes. The adverse effects are the inflationary pressures as a consequence on the other sectors intensives in energy inputs. The concerned

sectors are generally those intensive in petroleum products inputs such as transport, electricity and water production and food processing and manufacturing industries. The short run effects could be extended to medium and long term effects via spiral prices and wages 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 as a consequence 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 huge price differences between these countries (El-Katiri and Fattouh, 2015).

3. Input-Output price models methodology

The input-output models are granted to the Russian Nobel Prize, Wassily Leontief. Each economy is disaggregated to 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 amounts of each product used in the production of one unit of each sector are represented by a $(n \times n)$ matrix $A = (a_{ij})_n^n$, commonly called the technological matrix or technical coefficients of the entire economy. So, for a fixed i and j, a_{ij} is the amount 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.

4. Data and subsidy burden in the economy

We possess input-output matrices for the Moroccan economy for each year over the period 1998-2013, from the website of the High Commission for Planning in Morocco[2]. The data matrices are disaggregated on 20 producing 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 present data for three input-output tables of selected 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.

[2] 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 and trade and repairing sectors in 2012.

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 evolution of shares is 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.

The planning of removing such subsidies has started in July 2013 allowing reducing the peak of energy subsidies recorded in 2012 by a saved amount of nearly DH13 billion (about US$1.6 billion) or the equivalent of 2.1 percentage points of GDP. The 2014 is expected to reduce the energy subsidies by more while in 2015, more than 80% of energy subsidies are expected to be waived. This amount is the share on the total energy products of the gasoline and diesel been

totally unsubsidized starting from January 2015 and other fuel products partially unsubsidized.

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

	Total subsidies				Food products subsidies			Energy products subsidies			Oil imports	Oil Prices (Brent, Europe)
years	Million of Dh	% of GDP	% of Imports	% of public consumption	Million of Dh	% of total	% of GDP	Million 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	2.8	4.6	13.7	5,469	33.9	0.9	10,681	66.1	1.8	4.8	96.9
2009	12,788	2.1	4.4	9.6	3,488	27.3	0.6	9,300	72.7	1.5	3.9	61.7
2010	30,198	4.8	9.2	22.5	4,883	16.2	0.8	25,315	83.8	4.0	5.0	79.6
2011	51,197	7.7	13.1	35.0	6,859	13.4	1.0	44,338	86.6	6.7	6.7	111.3
2012	55,604	8.1	13.4	34.9	7,368	13.3	1.1	48,236	86.7	7.0	7.4	111.6
2013	41,600	5.8	10.2	25.1	6,330	15.2	0.9	35,270	84.8	4.9	6.6	108.6

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

5. Results and comments

Morocco imports all its energy products from which the major share is crude oil. The country is supplied by its refinery SAMIR[3] 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.

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

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 asymmetry found in most of the empirical literature[4], we also consider three symmetric scenarios for the decreasing of oil prices by the same percentages (-25%, -50% and -75%) to check for this asymmetry. 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 six previous scenarios of oil changes as changes in refined oil sector's inputs to the other sectors (sector 9, table 1). The assessment is therefore increasing/decreasing the intermediary consumption of oil sector used by other sectors and applying the input output price model formulae to study the impacts.

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 first of the period (1998), the middle (2005) and the last of the period (2012). The properties of the chosen 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.

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

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 detect also that in the symmetric scenarios (decreases), the magnitude of prices change is not significantly different from that of a symmetric increase. The difference in the two symmetric scenarios could attain 4.6 percentage points (22.3%-17.7%) in 2005, for 75% oil price change, recorded in the most inflated sector (transports). These differences, are however, not consistent to assume asymmetrical effects of the oil prices over the economy. The downward trend of the decreases effects compared to increases effects could be due to the resistance of some sectors to reduce prices and to imperfect competition in the economy. For example, in the common transport sector, the increase of oil prices is automatically and easily passed to the final consumer while the decrease faces resistance by public transporters like busses companies and individual taxies and needs severe control from the authorities.

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 refined oil price increases by respectively 25%, 50% and 75% (respectively decreases by -25%, -50% and -75%) on the structure of production inputs in 1998, 2005 and 2012.

		Effects on the structure of 1998 (%)						Effects on the structure of 2005 (%)						Effects on the structure of 2012 (%)					
		Increases by (%)			Decreases by (%)			Increases by (%)			Decreases by (%)			Increases by (%)			Decreases by (%)		
Rank	Economic sectors	25	50	75	-25	-50	-75	25	50	75	-25	-50	-75	25	50	75	-25	-50	-75
1	Agriculture, hunting, and related services	0.6	1.2	1.8	-0.6	-1.1	-1.6	1.2	2.5	4.0	-1.1	-2.2	-3.1	0.8	1.5	2.3	-0.7	-1.4	-2.1
2	Fishing and aquaculture	3.0	6.1	9.3	-2.9	-5.7	-8.4	4.0	8.2	12.9	-3.7	-7.0	-10.2	3.4	7.0	10.6	-3.3	-6.5	-9.6
3	Mining Industry	2.3	4.6	7.1	-2.2	-4.3	-6.4	4.4	9.1	14.3	-4.0	-7.8	-11.3	1.7	3.5	5.4	-1.7	-3.3	-4.9
4	Food Industry and Tobacco	1.1	2.2	3.3	-1.0	-2.1	-3.0	2.0	4.2	6.5	-1.9	-3.6	-5.2	1.6	3.2	4.9	-1.5	-3.0	-4.4
5	Textile industry and cook	0.9	1.8	2.8	-0.9	-1.7	-2.5	1.7	3.4	5.4	-1.5	-2.9	-4.3	1.6	3.2	4.9	-1.5	-3.0	-4.4
6	Chemical industry and para	1.4	2.9	4.5	-1.4	-2.7	-4.0	2.6	5.3	8.4	-2.4	-4.6	-6.6	1.3	2.7	4.1	-1.3	-2.5	-3.7
7	Mechanical, electric and metal industries	1.2	2.4	3.6	-1.1	-2.2	-3.3	2.1	4.4	6.8	-1.9	-3.7	-5.4	1.9	3.9	5.9	-1.8	-3.6	-5.4
8	Other manufacturing industries	2.8	5.7	8.7	-2.7	-5.3	-7.9	4.9	10.3	16.1	-4.6	-8.8	-12.7	4.8	9.9	15.0	-4.7	-9.2	-13.6
9	Oil refining and others	1.7	3.4	5.3	-1.6	-3.2	-4.8	4.0	8.4	13.2	-3.7	-7.2	-10.4	1.7	3.5	5.3	-1.6	-3.2	-4.8
10	Electricity and water	2.6	5.4	8.2	-2.5	-5.0	-7.4	3.4	7.0	11.0	-3.1	-6.0	-8.7	2.9	5.9	9.1	-2.8	-5.6	-8.2
11	Building and public works	2.0	4.1	6.3	-2.0	-3.8	-5.7	2.9	5.9	9.3	-2.6	-5.1	-7.4	2.8	5.7	8.7	-2.7	-5.4	-7.9
12	Trade and repairing	1.1	2.2	3.3	-1.0	-2.0	-3.0	2.0	4.2	6.6	-1.9	-3.6	-5.3	1.9	4.0	6.0	-1.9	-3.7	-5.5
13	Hotels and restaurants	0.6	1.3	2.0	-0.6	-1.2	-1.8	1.0	2.1	3.3	-0.9	-1.8	-2.6	0.8	1.6	2.5	-0.8	-1.5	-2.3
14	Transportation	3.3	6.8	10.4	-3.2	-6.3	-9.4	6.8	14.3	22.3	-6.3	-12.2	-17.7	7.1	14.4	22.0	-6.8	-13.5	-19.9
15	Post and telecommunications	0.2	0.5	0.7	-0.2	-0.4	-0.6	0.9	1.9	3.0	-0.9	-1.6	-2.4	1.1	2.3	3.5	-1.1	-2.2	-3.2
16	Financial activities and insurance	0.1	0.3	0.4	-0.1	-0.3	-0.4	0.2	0.4	0.7	-0.2	-0.4	-0.5	0.2	0.5	0.7	-0.2	-0.4	-0.6
17	Real estate, rental and services to enterprises	0.1	0.2	0.3	-0.1	-0.2	-0.3	0.2	0.4	0.6	-0.2	-0.3	-0.5	0.1	0.3	0.4	-0.1	-0.2	-0.4
18	General public administration and security	1.4	2.9	4.5	-1.4	-2.8	-4.1	1.6	3.3	5.2	-1.5	-2.8	-4.1	1.4	2.9	4.4	-1.4	-2.7	-4.0
19	Education, health and social work	0.2	0.4	0.6	-0.2	-0.4	-0.5	0.2	0.4	0.7	-0.2	-0.4	-0.5	0.1	0.3	0.4	-0.1	-0.3	-0.4
20	Other non financial services	0.3	0.7	1.0	-0.3	-0.6	-0.9	0.4	0.9	1.5	-0.4	-0.8	-1.2	0.4	0.8	1.2	-0.4	-0.7	-1.1

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 inflation, we account for the weight of each sector. The contribution of each sector to the overall cost inflation is its price change multiplied by the corresponding weight. The overall inflation is then a sum of the all sectors' contributions; a weighted sum of the 19 sectors' inflation rates excluding the oil sector as it is exogenous. The results, presented in table 4, are sorted from largest to smallest sector's change on the basis of 2012 results. For a scenario of 75% of oil price increase, the most inflated 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 inflation. 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 inflation 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							Effects of oil price increases on 2012 inputs						
		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.	17.1	2.4	0.1	0.3	0.4	6.5	13.	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	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	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	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	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				100.0	1.9	3.8	5.7				100.0	1.6	3.3	4.9
	Total Weighted Inflation (oil sector					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%.

6. Conclusion and policy discussion

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. Despite the uncertainty surrounding the oil prices outlook in general, the recorded low level of oil prices is expected by many specialists to last in 2015 before starting to shift upward with a high probability that initial levels could not be regained in the medium term. 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.

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 in late 2014 and the beginning of 2015, it is expected that low oil prices may not last and may regain their high levels by the end of this year. Under theses 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 inflation 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 inflation is mainly dragged by leading sectors intensive in oil products such as transports, electricity and water production and food processing and manufacturing industries.

We also show that the asymmetry effects are not strongly pronounced in our results in conformity with the majority of the studies in the literature of oil prices effects (Kristoufek and Lunackova, 2015); despite quite reduced effects when prices are downward compared to upward trend. We also use different input output matrices of years where actual oil prices are low (1998), medium (2005) and very high (2012) and sectors inputs weights are also 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.

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.

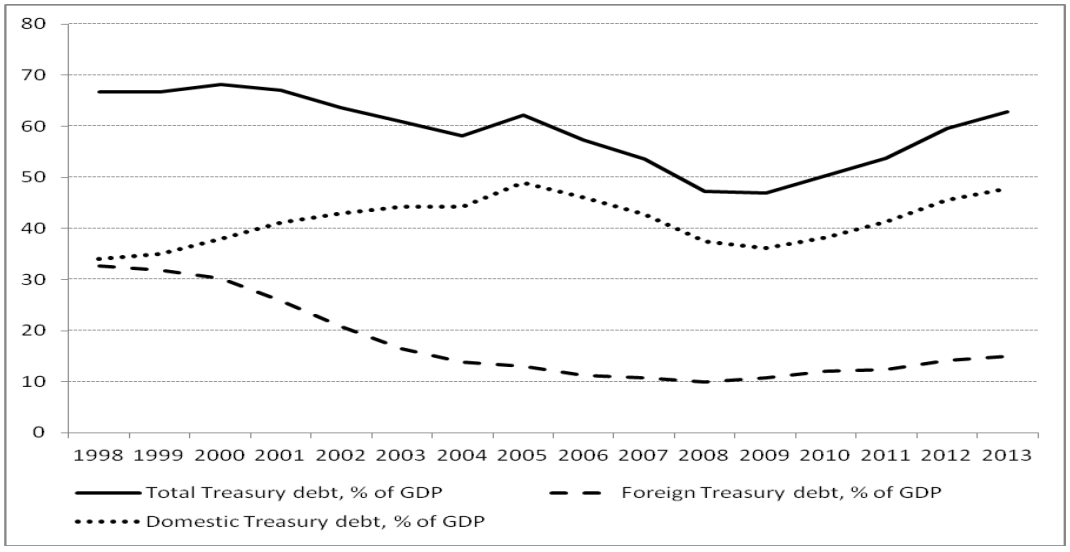
	Mean	STDEV	Minimum	Maximum	Range
Morocco	1.73	0.97	0.61	3.89	3.28
Tunisia	3.67	1.24	1.44	6.11	4.66
Kuwait	2.92	1.73	0.60	6.30	5.70
Bahrain	1.51	1.84	-1.26	4.60	5.86
Saudi Arabia	1.61	2.35	-2.08	6.10	8.18
Mauritania	5.70	2.49	2.14	12.13	9.99
Djibouti	3.20	2.51	-0.40	11.96	12.36
Jordan	3.83	3.14	-0.67	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
Islamic Republic of 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 Standard deviation to largest (column 3)

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. This sounds more arguable if we look at some monetary aggregates, such as, the public debt composition trend which is 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 (graph 1). This gives a signal of a constriction of the credit market by the Government.

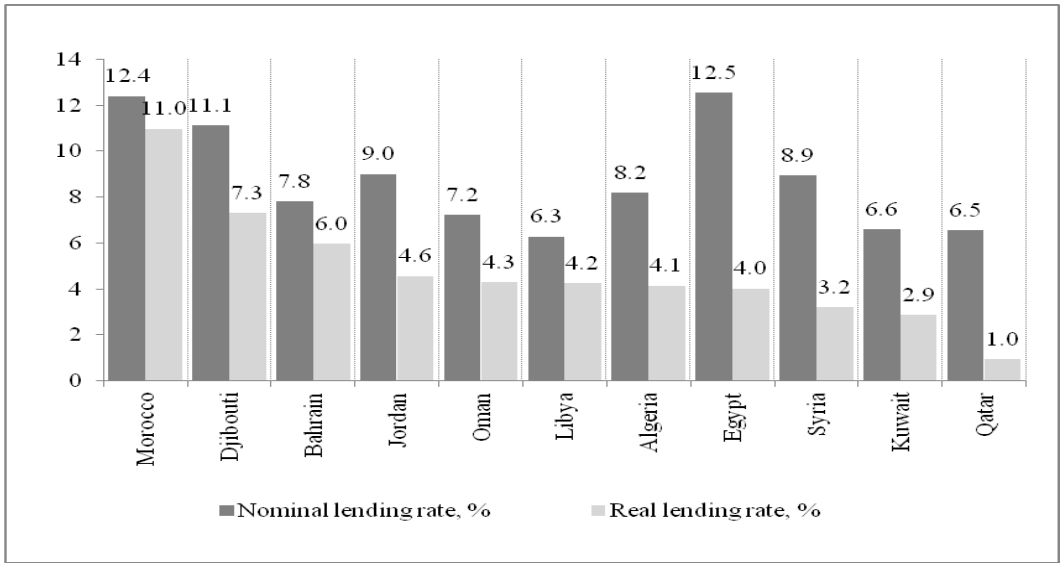
Graph 1: The evolution of treasury debt in Morocco, as percent of GDP.



Source: The Ministry of Economy and Finance, Morocco.

The fiscal policy plays also an important role by subsidies, as proven in this paper, in cushioning the effects of high prices of imported energy and food products. Moreover, the real lending rate, the real cost by which the private sector is financed from the banking sector, is the highest among the MENA region, despite an opposite low level of Central Bank policy rate compared to the MENA region (graph 2). This constitutes a brake on the demand and access to credit especially for SMEs, which impacts 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).

Graph 2: Average nominal and real lending rates over the period 2001-2013 for selected MENA countries (%)



Source: World Development Indicators database, the World Bank.

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. The Central Bank of Morocco should adopt a more flexible framework to cushion the foreign inflationary shocks. 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 become 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 by respectively 80% and 20%, will depreciate the dirham against the dollar leading to an increase in the debt level and 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.

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