# Modelling the Effects of Removing Subsidies on the Jordan Economy: First Application of the JorGE model

## Preliminary and Confidential

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# 1 INTRODUCTION

Using the Jordan General Equilibrium model and inputs supplied by the Ministry of Planning and International Cooperation (MOPIC), three scenarios are modelled. The first is a base case. This is a business-as-usual projection for the Jordan economy in which there is no change to current taxation arrangements. The remaining scenarios deviate from the first in response to removing subsidies on electricity, food, water and public services starting in 2015 and implemented fully by 2018. In the first of the alternative scenarios we remove only the electricity subsidy, which is the largest. In the second scenario we remove all subsidies.

A brief general description of JorGE is given in Section 2. Section 3 contains a summary of key aspects of the model's database. Aspects of simulation design are given in Section 4. The effects of subsidy removal are then discussed in Section 5, with results presented as deviations between the values of variables with the subsidy (subsidies) removed and their values in the base case.

# 2 JORGE THE MODEL

## 2.1 Overview

JorGE is a large-scale dynamic computable general equilibrium (CGE) model of the Jordanian economy. The theoretical structure of JorGE is a system of simultaneous equations which can be divided into three broad sets.

The first set of equations describes the behaviour of industries, investors, households, government and exporters, and is based on the theoretical structure of the MONASH model (Dixon and Rimmer, 2002). This set includes:

- equations describing industry demands for primary factors and intermediate inputs;
- equations describing household and other final demands for commodities;
- pricing equations setting pure profits from all activities to zero;
- market clearing equations for primary factors and commodities;
- miscellaneous definitional equations, e.g. equations defining GDP, aggregate

employment, and the consumer price index; and
- equations for facilitation of forecasting and policy simulations.

JorGE contains a number of dynamic mechanisms to facilitate forecasting and dynamic policy analyses. These dynamic mechanisms are the second set of equations. They describe (i) how industry capital stocks accumulate over time and (ii) how the labour market adjusts from a short-run environment (national real wage is unaffected by a shock and employment adjusts) to a long-run environment (national real wage adjusts so that any policy shock has not effect of aggregate employment).

The third set of equations includes additional information from the Social Accounting Matrix (JORSAM), not explicitly defined in the two previous sets. By adding these equations we model the income and spending of households, government and the rest of the world (Corong and Horridge, 2003).

## 2.2 Aspects of the theoretical structure of JorGE

In the current version of JorGE, 82 producers and investors minimise costs subject to their production functions. Short and long names for the 82 producers are shown in Table A1 of the appendix. Multiple households maximise their utility subject to budget constraints. Short and long names for the 20 households are shown in Table A2 of the appendix.

For each commodity, export demand is a negative function of export price. Government consumption and government investment are either exogenous, or assumed to change via a simple relationship with other relevant variables. Typically, it is assumed that government consumption is proportional to private consumption, and industry-specific government investment is proportional to the total investment in each industry.

Commodity markets are assumed to clear and be competitive. Demand equals supply for all domestically produced commodities and agents treat input and output prices as given in their decision making. The economy-wide labour market and industry-specific capital and land markets also clear.

JorGE has detailed treatment of margins, taxes, technologies and tastes. It has inter-temporal links for physical capital accumulation and labour market lagged adjustment processes.

It is assumed that investment undertaken in year $t$ becomes operational at the start of year $t+1$. Under this assumption, capital stock in industry $i$ accumulates according to:

$$K_{i,t+1} = K_{i,t}(1 - D_i) + I_{i,t} \quad (1)$$

where $K_{i,t}$ are $K_{i,t+1}$ industry $i$'s capital stock in years $t$ and $t+1$; and

$I_{i,t}$ is the quantity of new capital created for industry $i$ during year $t$.

Given a starting point value for capital in year $t$=0, and with a mechanism for explaining investment though time, equation (1) can be used to trace out the time paths of industry capital stocks. Investment in year $t$ for industry $i$ is a function of the expected rate of returns in industry $i$.

In comparative static analysis, one of the following two assumptions is made about the national real wage rate and national employment:

- The national real wage rate adjusts so that any policy shock has no effect on aggregate employment (a typical long-run assumption); or

- The national real wage rate is unaffected by the shock and employment adjusts (a typical short-run assumption).

One of the dynamic features of JorGE's is the allowance for a third, intermediate position, in which real wages can be sticky in the short run but flexible in the long-run, and employment can be flexible in the short-run but sticky in the long-run. For year-to-year policy simulations, it is assumed that the deviation in the national real wage rate increases through time in proportion to the deviation in national employment from its base case-forecast level. For example, if employment in the policy simulation is, say, above its base case forecast level, the real wage rate moves further and further above its forecast level. This leads to lower demand for labour, and employment adjusts downward over time until it returns to the base case forecast level, at which point adjustment pressure on the wage rate ceases. The implication of this is that favourable shocks generate a short-run gain in aggregate employment and a long-run gain in real wages.

JorGE includes a number of equations describing transfers between entities as part of its modelling of the JORSAM. These transfers include intra-households transfers, transfers from the government to households and receipts from the rest of the worlds. There is no formal theory describing these transfers. In principal, we link the transfer to an appropriate variable in the model. For example, intra-household transfers follow disposable household income and household receipts from abroad follows nominal GDP and an exogenous variable (Corong and Horridge, 2012).

# 3 JORGE THE DATABASE

The database for JorGE consists of three data sets, each set complementing the JorGE theory explained in section 2. The building block for creating a core database for JorGE is official data from an Input/output (IO) table for 2010. We supplement this data with data from the General Government Finance Bulletin (2013), the Central Bank of Jordan (2013), and Jordan's Household Expenditure and Income Survey (HEIS). A list of Sets and elements contained in each set is presented in Appendix 1.

The core theory of JorGE requires a database with separate matrices for basic, tax and margin flows for both domestic and imported sources of commodities sold to domestic and foreign users, as well as matrices for the factors of production.

The structure of the IO database is illustrated in Figure 1. The first three rows form the absorption matrix, rows 4 to 7 the production matrix and the two satellite matrices are the multi-production matrix and the tariff matrix.

In the absorption matrix, users are identified in the column headings and denoted by a number:

1. domestic producers divided into $i$ industries;
2. investors divided into $i$ industries;
3. a single representative household;
4. an aggregate foreign purchaser of exports;
5. government demand; and
6. changes in inventories.

The matrices in the first row, that is, V1BAS to V6BAS, represent direct flows of commodities, from all sources to users valued at basic prices. The first matrix, V1BAS, can be interpreted as the direct flow of commodity $c$, from source $s$, used by industry $i$ as an input into current production. V2BAS shows the direct flow of commodity $c$, from source $s$, used by industry $i$ as an input to capital formation. V3BAS shows the flow of commodity c from source s that is consumed by a representative household. V4BAS is a column vector and shows the flow of commodity $c$ to exports. V5BAS and V6BAS show the flow of commodity $c$ from source $s$ to the government and change in inventories respectively.

The matrices in row 1 contain only direct flows valued at basic prices. The basic price of a domestic commodity is the price the producer receives, and excludes margin costs and sales taxes. The basic price of an imported commodity is the duty-paid price, that is, the price at the port of entry just after the commodity has cleared customs. It excludes all sales taxes and margin costs but includes tariffs. It is assumed that the basic price is the same for all users. The row sums are the total direct usage of a commodity. It should be noted that all the values, with the exception of V6BAS, are positive. V6BAS records the change in inventories, and thus can be positive or negative.

The second row, V1MAR to V5MAR, represents the value of commodities used as margins to facilitate the basic flows in row 1. JorGE includes three margin commodities, trade, road and rail transport. All margins are produced domestically. V1MAR and V2MAR are four-dimensional matrices and show the cost of margin service $m$ used to facilitate the flow of commodity $c$, from source $s$ to industry $i$. V3MAR and V5MAR are three dimensional and show the cost of margin service $m$ that facilitates the flow of commodity *c* from source *s* to the representative household and the government respectively. V4MAR is a two-dimensional matrix and shows the cost of margin service $m$ that facilitates commodities flows to exporters. There are flows that do not require any margins and therefore the values in these matrices are zero or the matrices are omitted. This is mainly for services and inventories (unsold commodities).

The third row represents the tax matrices, V1TAX to V5TAX. These matrices show the taxes paid in the delivery of domestic and imported commodities to the different users. Positive values refer to taxes and negative values to subsidies. For example, a positive element in V1TAX and V2TAX can be interpreted as the tax associated with the delivery of commodity $c$ from source *s* used by industry $i$ as an input into current production and capital formation respectively. A negative value is interpreted as a subsidy paid on commodity $c$, from source *s*, used by industry $i$. V3TAX and V5TAX are interpreted as the taxes associated with the delivery of commodity $c$ from source *s* used by households and government. V4TAX is associated with the taxes paid for the delivery of commodities to exporters. Taxes are not paid on inventories and therefore there is no V6TAX matrix.

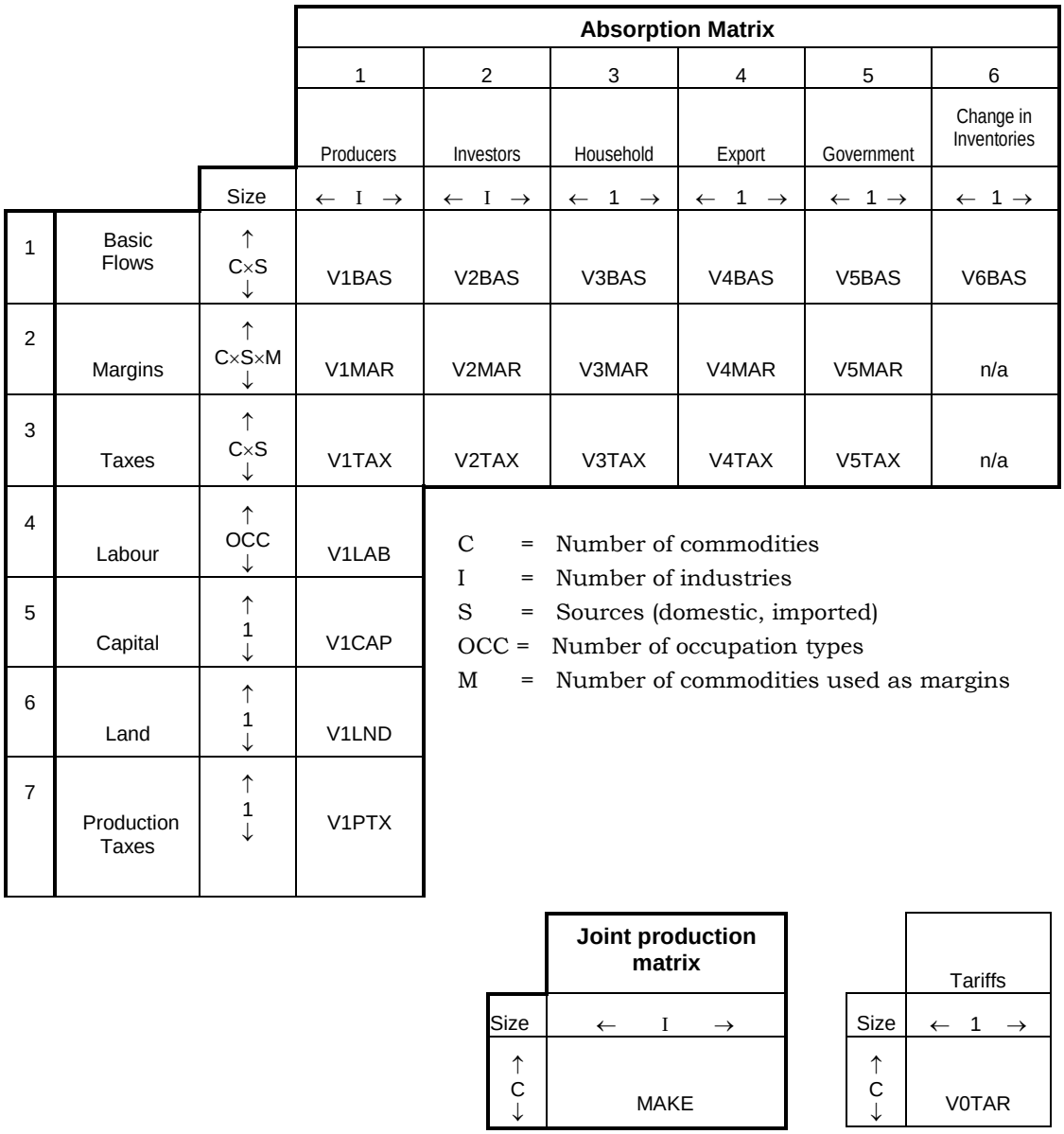


**Figure 1. The input–output database**

Rows 4 to 6 contain matrices that provide a breakdown of the primary factors used by industry in current production. These matrices include the inputs of three factors of production: occupation-specific labour (V1LAB), capital (V1CAP) and agricultural land (V1LND). For example, V1LAB shows the purchase of labour of skill *o* by industry $i$ that is used as an input into current production. V1CAP contains the rental value of each industry's fixed capital and V1LND shows the rental value of agricultural land used by each industry. Industry also pays production taxes such as business licences, payroll taxes and stamp duties. These taxes are contained in V1PTX in row 7. The database shows that labour, capital, land and production costs are only used in current production and therefore these matrices are absent from entries in the capital formation, household consumption, exports, government and change in inventories columns.

The satellite matrices illustrate the multi-production matrix (MAKE) and tariff matrix. Each element in the MAKE matrix refers to the basic value of commodity $c$ produced by industry $i$.

The MAKE matrix in JorGE is a joint-production matrix where an industry can produce more than one commodity and a commodity can be produced by more than one industry. A number of the off-diagonal values are non-zero.

The final matrix, V0TAR, contains tariff revenue by imported commodity. The tariff matrix is separate from the absorption matrix because the values of tariff revenues are already included in the basic price of imports, that is, they are already included in the basic flows in row 1. It enables the calculation of ad valorem rates as the ratio between tax revenues and the relevant basic flows of commodities on which the taxes are levied.

The capital accumulation mechanism in JorGE allows for capital stocks to accumulate over time (See equation 1). This mechanism states that industry-specific capital stock in year *t+1* is equal to capital stock in year *t* plus net industry-specific investment in year *t*. For this mechanism to be operational, we need industry-specific information on capital stock and investment. The IO table only contains information on commodity-specific investments, not by industry. No industry-specific capital stock data is available. The industry-specific capital stock data derived for JorGE is consistent with industry-specific capital rental and industry output data from the IO Table (2010), factor shares, average growth rates for GDP and factor inputs.

# 4 SIMULATION DESIGN

## 4.1 Assumptions for the Macro economy in the policy scenarios

The following assumptions are made for key aspects of Jordan's macro-economy in the deviations simulations.

### 4.1.1 Labour markets

The subsidy-removal simulations are year-to-year recursive-dynamic simulations, not comparative-static simulations. In a year-to-year simulation it is assumed that deviations in the national real wage rate from its base-case level increase through time in proportion to deviations in the national unemployment rate. The coefficient of adjustment is chosen so that effects of a shock on the unemployment rate are largely eliminated after about ten years.

Lagged adjustment of the real-wage rate to changes in employment (unemployment) is assumed. Taxation changes are allowed to cause employment (unemployment) to deviate from its base-case value initially, but thereafter, real wage adjustment steadily eliminates the short-run employment (unemployment) consequences. This labour-market assumption reflects the idea that in the long run national employment moves with labour supply, which is determined by demographic factors that are unaffected by taxation arrangements.

### 4.1.2 Private consumption and investment

Private consumption expenditure is determined via a consumption function which links nominal consumption to Household Disposable Income (HDI). HDI is the sum of payments to domestic labour and capital (wages and profit dividends) and government transfer payments net of direct taxation. In these simulations the Average Propensity to Consume (APC) is endogenous, and moves to keep the balance on trade account at its base case value. In other words, we assume that deviations in national investment are matched by deviations in domestic savings, leaving the economy's call on foreign savings unchanged. Under this assumption the change in consumption away from its base case value is a valid measure of the welfare of removing subsidies on the welfare of the incumbent population.

Investment in each industry is allowed to deviate from values in the base case scenario in line with deviations in expected rates of `return. Investors are assumed to be myopic, implying that expected rates of return move with current rates of return.

### 4.1.3 Rates of return on capital

In the subsidy reform scenarios, JorGE allows for short-run divergences in rates of return on industry capital stocks from their levels in the base case. Such divergences cause divergences in investment and hence capital stocks. The divergences in capital stocks gradually erode the initial divergences in rates of return, so that, provided there are no further shocks to the system, in the long run rates of return revert to their base case levels.

### 4.1.4 Government consumption and fiscal balances

JorGE contains no theory to explain changes in real public consumption. In these simulations, public consumption is exogenous and set to base case values. The fiscal balance of the Jordan government is allowed to vary in response to the removal of subsidies.

### 4.1.5 Production technologies and household tastes

JorGE contains many types of technical-change and household-preference-change variables. Under the policy options, it is assumed that all technology and preference variables are exogenous and have the same values as in the base case projection.

### 4.1.6 Numeraire price

JorGE explains changes in relative prices, but has no mechanism to determine the absolute price level. Thus one price must be exogenous. This price is called the numeraire, and it is the benchmark against which all other prices are measured. For the simulations reported here, the numeraire is the nominal exchange rate.

## 4.2 Inputs from MOPIC

The subsidy cuts begin in 2015, and are removed in a linear way by 2018. MOPIC has provided the following subsidy values for 2013 (JDm, current prices):

| Product subsidised | Period | JD Million |
|---|---|---|
| Food | 2013 | 225 |
| Gas Cylinder | 6 month 2013 | 24 |
| Water | 9 month 2013 | 190 |
| Electricity | 9 month 2013 | 856 |
| Education | estimated for the end of 2013 | 57 |
| Health | estimated for the end of 2013 | 93 |

*Primary source is Ministry of Finance.*

It is assumed that the subsidy values shown above apply for the full year, 2013, and remain unchanged through to 2015. In the base case the subsidies increase in line with increases in underlying activity through to the end of the simulation, 2025. In the first deviation simulation, the subsidy on electricity is cut to zero by 2018 and remains at zero thereafter. Subsidies on the

remaining items are fixed to their base case values. In the second deviation simulation, subsidies on all items are cut to zero by 2018 and remain at zero thereafter.

The sum of subsidies shown in the table above is 1,445 JDm. Of this, 60 per cent is the subsidy on electricity. Total subsidy revenue is equivalent to around 7 per cent of GDP in 2013. The electricity subsidy is equivalent to 4.2 per cent.

# 5 ECONOMIC EFFECTS OF SUBSIDY REMOVAL

## 5.1 Removal of the electricity subsidy only

This section contains a discussion of deviations from base case values for the case where only the electricity subsidy is removed. Macroeconomic impacts are dealt with first, followed by impacts on a selection of structural variables. Italicized headings outline the main features of the results.

***In the short run, removing the electricity subsidy causes employment to fall relative to its base case level. Over time, the employment deviation is progressively eliminated as the real wage rate adjusts. In the long-run employment rises slightly relative to its base case level due to compositional shifts in the economy.***

The explanation of macro effects begins with the impacts on the labour market. Figure 2 shows percentage deviations in national employment, the real wage rate and the real cost of labour. The real wage is defined as the ratio of the nominal wage rate to the price of consumption. The real cost of labour is defined as the ratio of the nominal wage rate to the national price of output (measured by the factor-cost GDP deflator).

According to the labour-market specification in JorGE the real wage rate is sticky in the short run. In other words, the nominal wage moves with the price of consumption. Over time, however, the real wage adjusts downwards as employees and people looking for work respond to a loss in employment opportunities.

Employment falls in the short-run because of an increase in the real cost of labour (see Figure 1). The real cost of labour increases because removing the subsidy on electricity causes the price of spending (consumption, for example) to rise relative to the price of production. Initially, because the nominal price of labour tied to the price of consumption, the price of labour must rise relative to the price of output. An increase in the real cost of labour causes producers to substitute away from labour and towards relatively cheaper alternatives such as capital.

Over time, the real wage rate and the real cost of labour progressively fall relative to base case levels, forcing employment back towards its base-case value. The maximum employment deviation is -2.03 per cent in 2017. In 2025, the employment deviation is 0.24 per cent. In the final year, with the employment deviation more than eliminated, the real wage rate is down by 2.98 per cent.

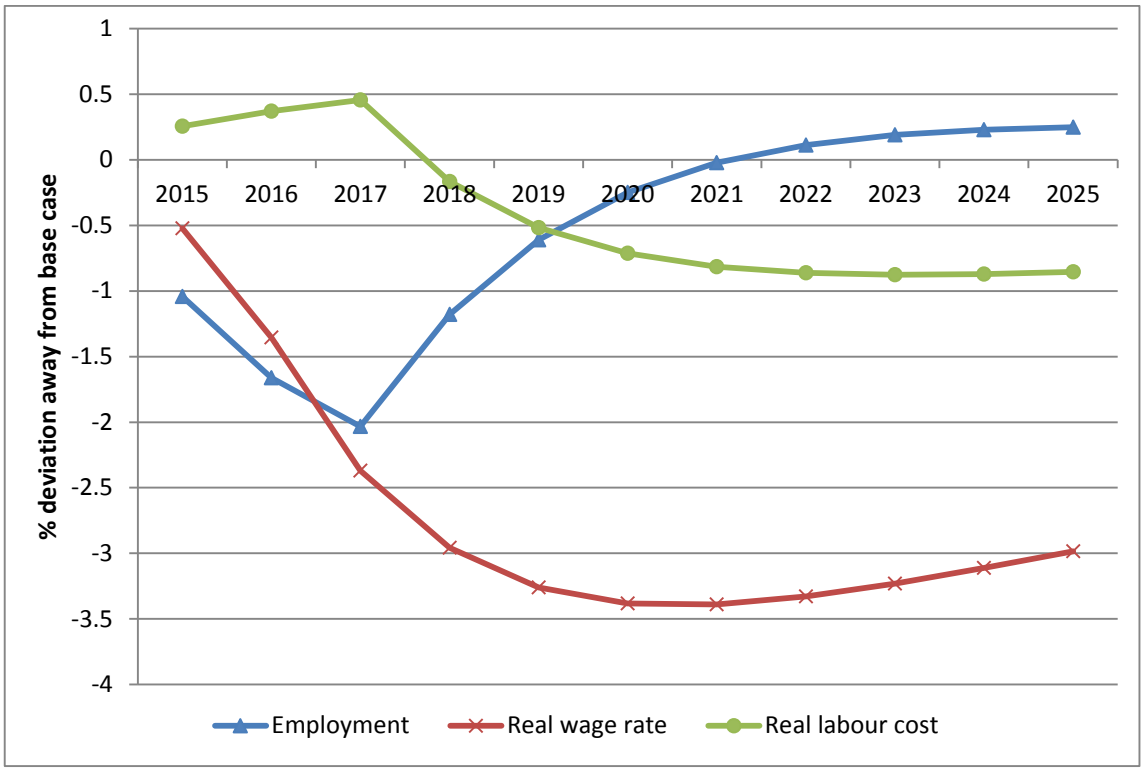


**Figure 2: Deviations (%) from base case in employment and real wage rates (removal of electricity subsidy only)**

A final point to note is that even though the long-run change in national employment is small, this does not mean that employment at the individual industry or regional level remains close to base-case values. In most industries and regions, there are significant permanent employment responses to the subsidy changes, compounding or defusing existing (base-case) pressures for structural change.

### *Removal of the electricity subsidy reduces capital slightly. In the short-run the economy's labour/capital ratio falls. In the long-run it rises.*

Figure 3 shows percentage deviations from base-case values for the national capital stock and employment. In 2025, the capital-stock deviation is -0.48 per cent, implying an increase in the ratio of labour to capital of 0.72 per cent (= 0.24 per cent minus -0.48 per cent).

The gradual reduction in capital relative to its base case value is due, in the main, to changes in relative factor prices. Over the longer term, with the real cost of labour falling (see Figure 2), there is scope for the real cost of capital to rise. This induces producers to substitute labour for capital across the economy.

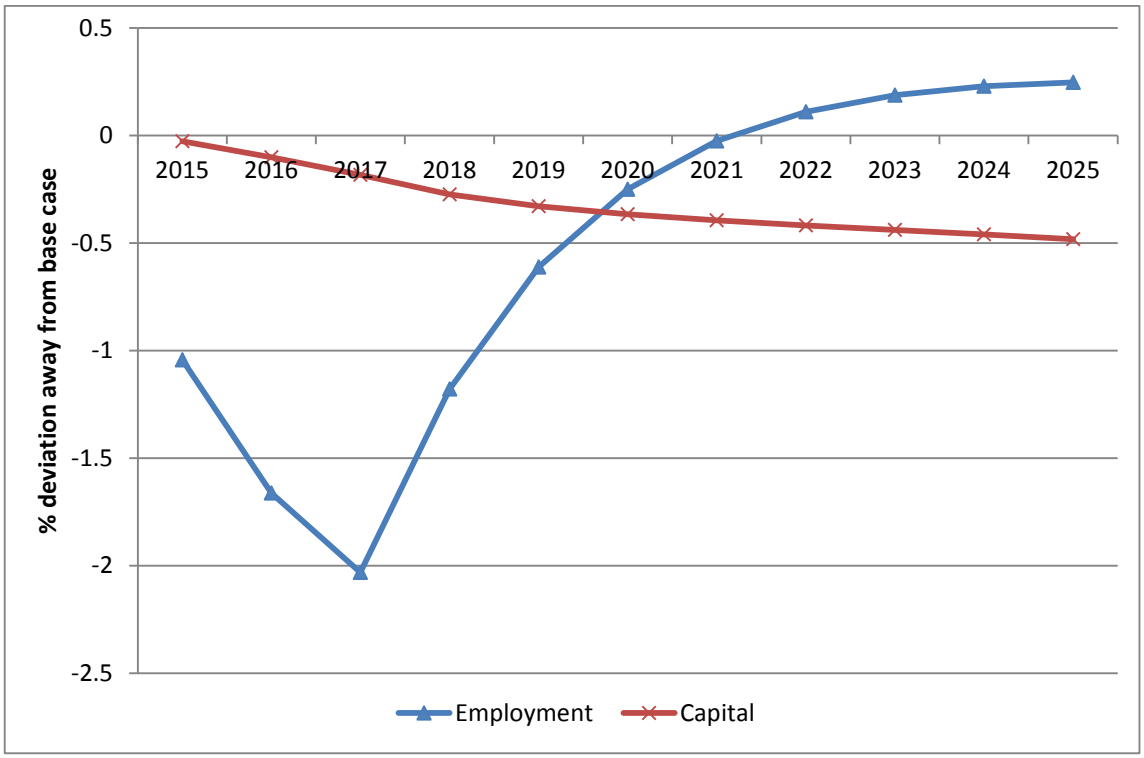


**Figure 3: Deviations (%) from base case in employment and capital (removal of electricity subsidy only)**

***Removing the electricity subsidy eliminates a relatively large distortion in the economy. This improves the efficiency of resource use, such that even though employment and capital in most years fall relative to base case levels, real GDP rises.***

The percentage change in real GDP is a share-weighted average of the percentage changes in quantities of factor inputs (labour, capital and land and natural resource), with allowance for changes in the efficiency of resource use. Increased (reduced) efficiency increases (reduces) real GDP even with unchanged levels of factor inputs. Figure 4 shows, in stacked annual columns, the contribution of each component to the overall percentage deviation in real GDP. Note that the contributions of land and natural resource are zero and are not shown; although land can be re-allocated between uses, its availability overall is fixed.

Real GDP increases relative to its base-case level in all years of the simulation. In the final year it is up 0.69 per cent. As the Figure shows, efficiency gains account for more than 100 per cent of the additional real GDP. These efficiency gains represent the reduction in deadweight loss associated with removing the distortions created by the electricity subsidy in the base case.

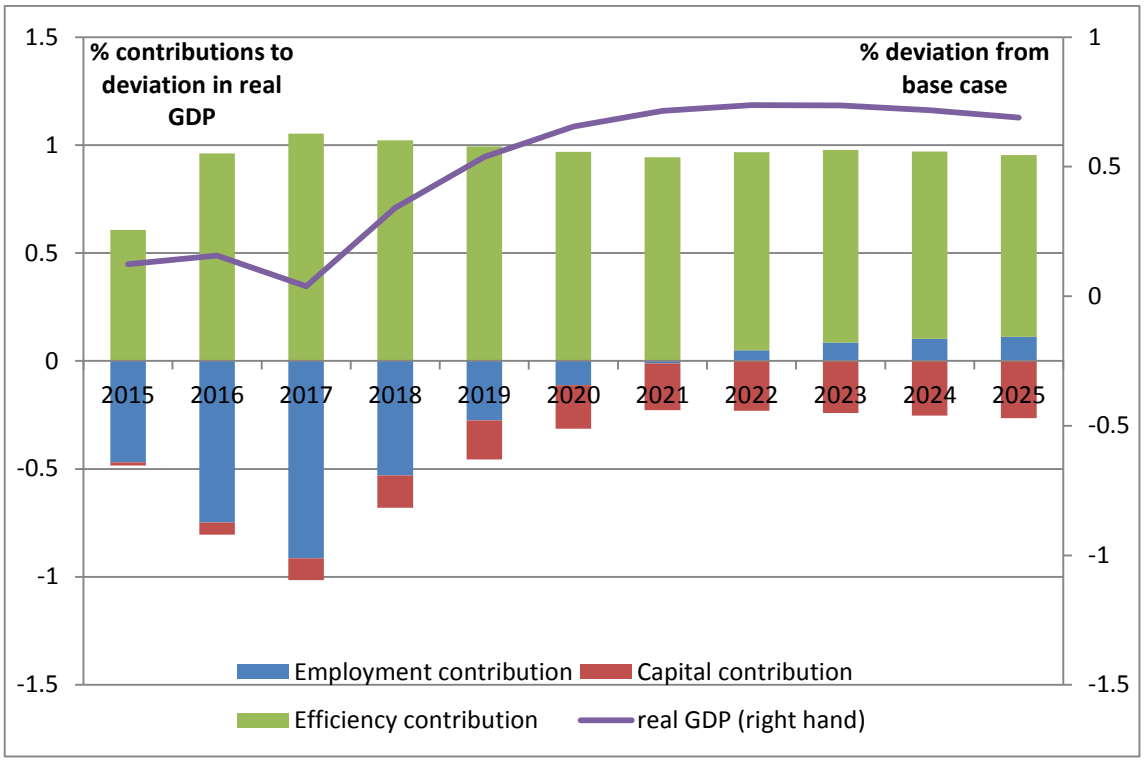


**Figure 4: Contributions to overall deviation (%) from base case in real GDP (removal of electricity subsidy only)**

***Removing the electricity subsidy increases real private consumption and, hence, improves the overall welfare of the population.***

Figure 5 shows percentage deviations from base-case values for the three main components of real Gross National Expenditure (GNE): real private consumption (C), real public consumption (G) and real investment (private plus public) (I).

In these simulations, all of the benefit of the efficiency improvements shown in Figure 4 returns to private consumers as increased real income, as does the public money spent in the base case on subsidising electricity. Accordingly, the removal of the subsidy increases real private consumption, even after making allowance for the increase in price paid for electricity by households. The increase in real consumption relative to base case level in 2025 is 2.03 per cent, which is equivalent to around 460 JDm in 2013 prices. This money can be considered to be the welfare improvement associated with the cut in electricity subsidy.

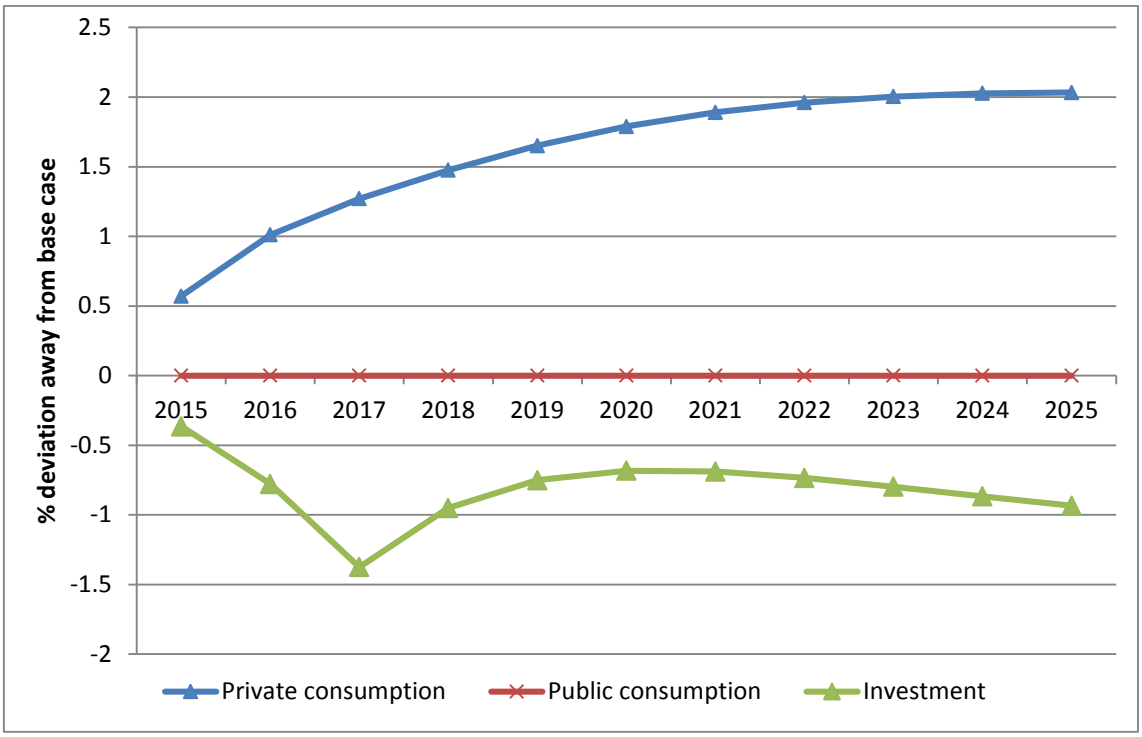


**Figure 5: Deviations (%) from base case in real consumption and investment (removal of electricity subsidy only)**

### *In the first half of the period, real GNE rises relative to real GDP leading to deterioration in the net volume of trade.*

Real public consumption (G) by assumption is fixed to its base case (see Figure 5). Deviations in real investment (I) (see Figure 5) accommodate the reduced capital shown in Figure 3. Overall, real Gross National Expenditure (GNE) (= C+I+G) rises by more than real GDP (Y), implying deterioration in the net volume of trade (X-M). This is shown in Figure 6, which gives changes from base case values in the volume of exports (X) and the volume of imports (M). In 2017 when the last of the subsidy cuts occur, real GNE relative to real GDP has increased by 0.16 per cent. In that year, relative to base case levels the volume of imports is down 1.37 per cent, while the volume of exports is down 2.74 per cent. Much of the fall in imports is due to the fall in investment; investment is a very import intensive component of demand.

To achieve the necessary response in the net volume of trade, changes in the real exchange rate are necessary (see Figure 6). Throughout the period the real exchange rate is above its base case level. Real appreciation of the exchange rate reduces the competitiveness of Jordan's export industries on foreign markets and the competitiveness of Jordan's import-competing industries on local markets.

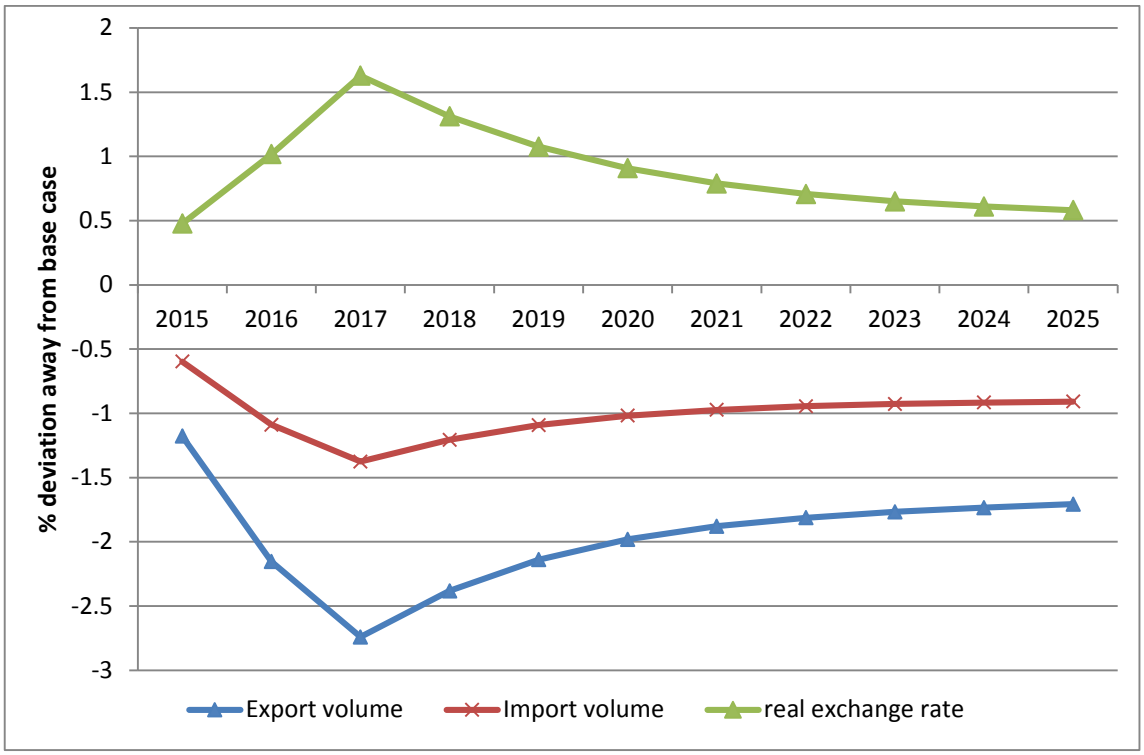


**Figure 6: Deviations (%) from base case in trade volumes and the real exchange rate (removal of electricity subsidy only)**

### *Production in some industries increases relative to base case, while production in other industries falls.*

Table 2 shows projected changes in output (relative to base case values) for the industries affected most by removal of the electricity subsidy.[1] Information is provided for two years, the final year of the subsidy cuts, 2017 and the last year of the simulation, 2025. For each year, the table shows projections for percentage changes in industry output sorted from largest positive to largest negative. For example, in 2017 the first industry listed is education (industry 78), which is projected to experience the largest percentage increase in production. The final industry is electricity (industry 86), which is projected to experience the largest fall in production.

Comparing 2017 with 2025, shows that there is relatively little change in the pattern of results across industries. So, for the sake of brevity we concentrate on the numbers for 2025.

The industries that stand out in terms of percentage deviations in production are at the bottom of the table – electricity (industry 56) and pipeline services (63). The electricity industry is the only customer of pipeline services, so the two industries are essentially one. With the electricity subsidy removed, relative to its base case level the purchases' price of electricity rises significantly. The average increase across all users of electricity is 89.32 per cent. Note that the tax incidence on electricity price is higher (95.51 per cent) due to a 6.12 per cent fall in producer price. The increase in purchases' price reduces demand in price sensitive areas such as household consumption and intermediate demand by trade-exposed industries. Overall, relative to base case, the production of electricity and pipeline services falls by over 35 per cent.

[1] See Table A1 for the long descriptions of the short names of industries.

The industry with the next largest fall in production is water supply (industry 57). Its production is down 5.33 per cent relative to base. Electricity inputs comprise around 20 per cent of the total cost of the water supply industry. When the subsidy is removed, the price of this input increases by nearly 90 per cent, lifting unit costs in water supply by around 17 per cent. Some of this is passed on to customers, but not all and so demand and production fall.

All of the other unfavourably affected industries shown in Table 2 have relatively high electricity shares in total costs and face relatively elastic demand curves. Because of elastic demand these industries cannot easily pass on the cost increases arising from the jump in electricity price. Typically, these are trade-exposed industries. Good examples are fabricated metal products (industry 47), refinery products (30) and basic metal products (45).

The most favourably affected industries are dwelling services (industry 37), education services (78) and domestic appliances (49). Their main customer is household demand, which increases by around 2.0 per cent relative to base case levels in 2025 (see Figure 5). Electricity comprises only a small share in the cost of production for these industries. So, with relatively high expenditures elasticities, they receive a boost in demand and production above the two per cent projected for aggregate real household consumption. A similar story applies to the remaining industries with top-ten rankings shown in Table 2.

### *Removing the electricity subsidy has differing effects on real consumption of the household categories in JorGE. In general, real consumption of the low-income households rises by less than the real consumption of the high-income households.*

Table 3 gives projection of the percentage deviations from base case values for the real consumption of the different households recognised in JorGE.[2] Household are listed according to their expenditure decile. The first household group consists of households in the lowest expenditure decile. The last group consists of households is the highest expenditure decile.

In general, households in the lower portion of Table 3 are projected to experience larger gains in real consumption than households in the upper portion in response to removing the electricity subsidy. This suggests that the subsidy when in place has a progressive effect on income distribution.

But perhaps the most notable feature of the results in Table 3 is the evenness of outcome across the household types. Real consumption of all households increases when the subsidy is removed, and the gap between the least and most affected household group is less than 2 percentage points in 2025. This requires further investigation.

### *Removing the electricity subsidy increases government revenue from taxation (net of subsidies)*

In 2025, removing the electricity subsidy increases government revenue from taxation by 972 JDm (2013 prices). A little less than 90 per cent of that increase comes directly from the cut in electricity subsidy. The rest comes from increased income and indirect tax receipts due to the increase in size of the economy.

[2] Table A2 in the appendix gives short and long names for the 20 households recognised in the model.

## 5.2 Removal of all subsidies

In the second of the two alternative scenarios, all subsidies are removed. The results are very similar to the electricity-only case (section 5.1). This is not surprising given that the electricity subsidy is around 60 per cent of the total.

In general at the macroeconomic level the deviations from base case values when all subsidies are removed are slightly magnified relative to the deviation when only the electricity subsidy is removed. This is highlighted in Figure 7, which is analogous to Figure 4.

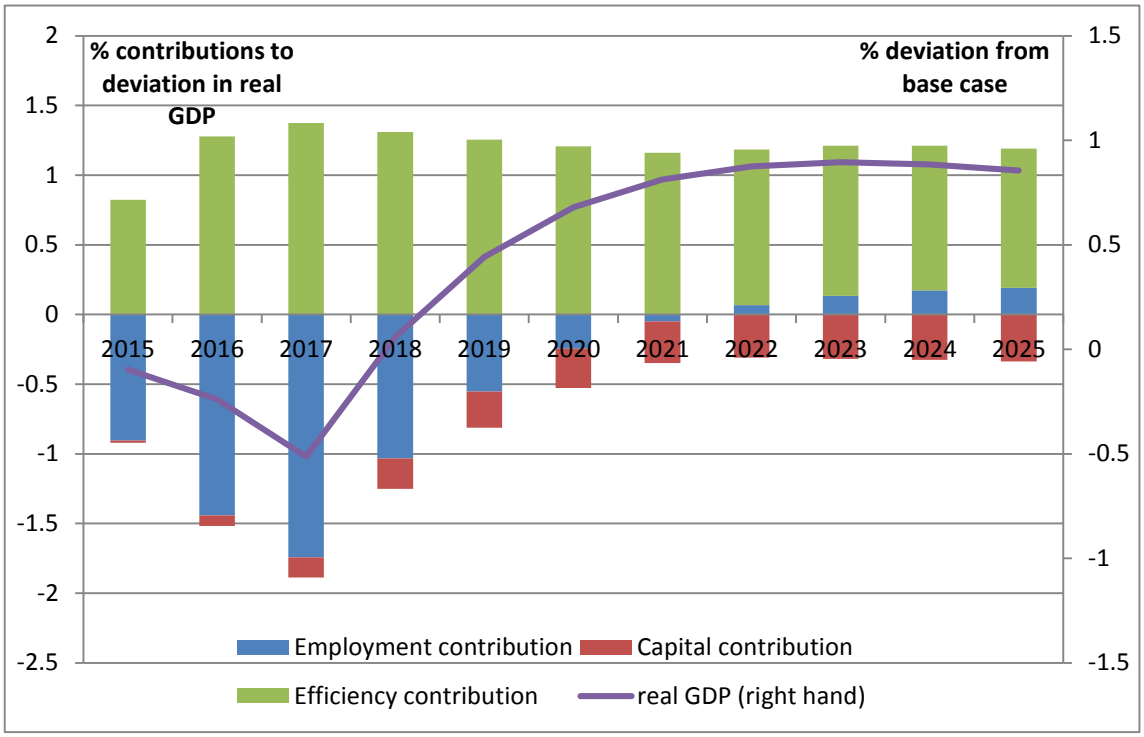


**Figure 7: Contributions to overall deviation (%) from base case in real GDP (removal of all subsidies)**

In 2025, removing all subsidies increases real GDP relative to its base case level by 0.85 per cent. Figure 4 shows an increase of 0.69 per cent when the electricity subsidy only is removed. In both cases, increased efficiency of resource use associated with removing distortions created by subsidies is the driver of the gain in real GDP. In both cases, the contributions of capital and labour in the final years are small.

Figure 7 is analogous to Figure 4. Removing all subsidies elevates real consumption above its base case value in 2025 by 2.43 per cent, compared with 2.03 per cent when only the electricity subsidy is removed. In monetary terms, the consumption-increase in the all subsidies case is 551 JDm.

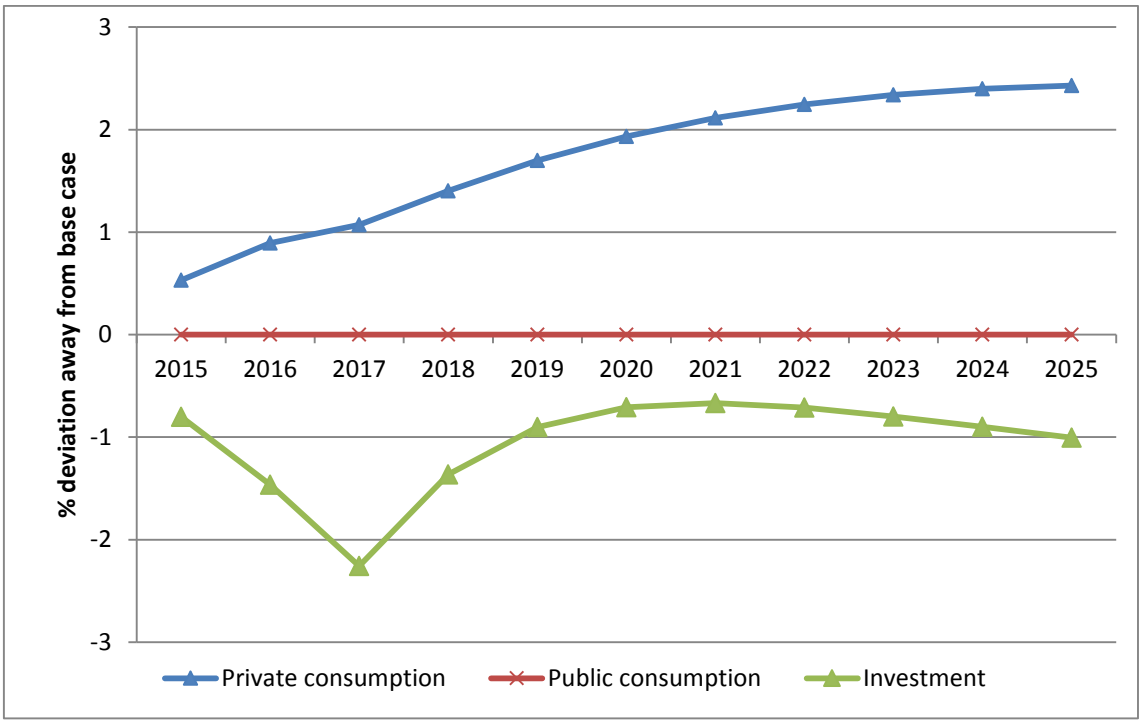


**Figure 7: Deviations (%) from base case in real consumption and investment (removal of all subsidies)**

For industries and households, the effects of removing all subsidies are a little different to the effects of removing just the electricity subsidy. However, the general themes remain the same. Table 4 shows industry output effects due to removing all subsidies. Compared to the effects shown in Table 2 for the electricity only case, we now find that health services (industry 59), bakery products (15) and water supply (57) join electricity and the associated pipeline industry as sectors projected to experience significant losses in output relative to base case values. These industries are heavily subsidised in the base case, and with removal of those subsidies suffer from large reductions in demand due to increases in purchases' prices. In 2025, relative to base case values the average purchases' price for health services rises 3.7 per cent, for bakery products 82.3 per cent, and for water supply 111.1 per cent.

Table 5 shows the effects on real consumption of the different household types arising from removing all subsidies. Again, households in the bottom half of the table tend to do better than households overall in the upper half. But the pattern of effects is much more uneven than when the electricity subsidy only is removed (compare Table 5 with Table 3). Further investigation is needed.

**Table 2: Percentage deviations in output of selected industries, ranked, (removal of electricity subsidy only)**

| 2017 | | | 2025 | | |
|---|---|---|---|---|---|
| Rank | Industry | % change | Rank | Industry | % change |
| 1 | 78 Education | 1.11 | 1 | 77 Dwelling | 3.06 |
| 2 | 55 OthManuf | 0.95 | 2 | 78 Education | 2.47 |
| 3 | 18 SoftDrinks | 0.88 | 3 | 49 DomAppl | 2.45 |
| 4 | 49 DomAppl | 0.87 | 4 | 55 OthManuf | 2.41 |
| 5 | 70 TeleComSve | 0.83 | 5 | 24 LeatherPrd | 2.14 |
| 6 | 34 SoapDeter | 0.66 | 6 | 70 TeleComSve | 2.14 |
| 7 | 15 BakeryPrd | 0.63 | 7 | 68 TravelSve | 1.97 |
| 8 | 77 Dwelling | 0.59 | 8 | 53 OthTransEq | 1.94 |
| 9 | 16 SugarPrd | 0.58 | 9 | 16 SugarPrd | 1.86 |
| 10 | 17 OthFoodPrd | 0.49 | 10 | 18 SoftDrinks | 1.81 |
| | | | | | |
| 73 | 46 StrMetPrd | -1.38 | 73 | 28 PaperPrd | -1.79 |
| 74 | 45 BasMetPrd | -1.60 | 74 | 35 OthChem | -1.81 |
| 75 | 28 PaperPrd | -1.73 | 75 | 44 NonFerMet | -1.89 |
| 76 | 37 PlasticPrd | -1.75 | 76 | 37 PlasticPrd | -2.11 |
| 77 | 60 HotelRest | -1.99 | 77 | 45 BasMetPrd | -2.21 |
| 78 | 47 FabrMetPrd | -2.12 | 78 | 30 RefinedPrd | -2.28 |
| 79 | 30 RefinedPrd | -2.92 | 79 | 47 FabrMetPrd | -2.80 |
| 80 | 57 WaterSup | -6.67 | 80 | 57 WaterSup | -5.33 |
| 81 | 63 PipelinTrn | -38.00 | 81 | 63 PipelinTrn | -35.15 |
| 82 | 56 Electricit | -38.15 | 82 | 56 Electricit | -35.30 |

**Table 3: Percentage deviations in real Consumption by Household type (removal of electricity subsidy only)**

| Household type | % change 2017 | % change 2025 |
|---|---|---|
| 1 H1_JOR | 0.89 | 1.80 |
| 2 H1_NJOR | 0.49 | 1.06 |
| 3 H2_JOR | 0.71 | 1.65 |
| 4 H2_NJOR | 2.18 | 2.35 |
| 5 H3_JOR | 0.65 | 1.60 |
| 6 H3_NJOR | 0.68 | 1.21 |
| 7 H4_JOR | 0.73 | 1.66 |
| 8 H4_NJOR | 0.39 | 1.02 |
| 9 H5_JOR | 0.99 | 1.85 |
| 10 H5_NJOR | 0.63 | 1.17 |
| 11 H6_JOR | 0.69 | 1.62 |
| 12 H6_NJOR | 1.14 | 1.53 |
| 13 H7_JOR | 0.81 | 1.70 |
| 14 H7_NJOR | 0.71 | 1.21 |
| 15 H8_JOR | 0.87 | 1.75 |
| 16 H8_NJOR | 1.90 | 2.11 |
| 17 H9_JOR | 1.21 | 1.99 |
| 18 H9_NJOR | 1.42 | 1.72 |
| 19 H10_JOR | 2.11 | 2.66 |
| 20 H10_NJOR | 3.40 | 3.39 |

**Table 4: Percentage deviations in output of selected industries, ranked, (removal of all subsidies)**

| 2017 | | | 2025 | | |
|---|---|---|---|---|---|
| Rank | Industry | % change | Rank | Industry | % change |
| 1 | 55 OthManuf | 1.35 | 1 | 77 Dwelling | 4.34 |
| 2 | 49 DomAppl | 1.28 | 2 | 55 OthManuf | 4.22 |
| 3 | 70 TeleComSve | 1.09 | 3 | 24 LeatherPrd | 4.20 |
| 4 | 18 SoftDrinks | 1.02 | 4 | 49 DomAppl | 4.14 |
| 5 | 34 SoapDeter | 0.90 | 5 | 68 TravelSve | 4.14 |
| 6 | 68 TravelSve | 0.83 | 6 | 53 OthTransEq | 4.14 |
| 7 | 77 Dwelling | 0.78 | 7 | 64 SeaTrans | 3.72 |
| 8 | 17 OthFoodPrd | 0.64 | 8 | 48 MachEquip | 3.36 |
| 9 | 40 CutStone | 0.58 | 9 | 52 MotVehicle | 3.27 |
| 10 | 66 TransSve | 0.55 | 10 | 70 TeleComSve | 3.24 |
| | | | | | |
| 73 | 37 PlasticPrd | -2.00 | 73 | 37 PlasticPrd | -1.59 |
| 74 | 13 GrainPrd | -2.13 | 74 | 45 BasMetPrd | -1.79 |
| 75 | 47 FabrMetPrd | -2.25 | 75 | 30 RefinedPrd | -1.94 |
| 76 | 30 RefinedPrd | -3.15 | 76 | 60 HotelRest | -2.08 |
| 77 | 60 HotelRest | -3.93 | 77 | 47 FabrMetPrd | -2.37 |
| 78 | 79 HealthServ | -5.64 | 78 | 79 HealthServ | -3.55 |
| 79 | 15 BakeryPrd | -15.55 | 79 | 15 BakeryPrd | -11.75 |
| 80 | 57 WaterSup | -31.36 | 80 | 57 WaterSup | -26.22 |
| 81 | 63 PipelinTrn | -39.53 | 81 | 63 PipelinTrn | -36.09 |
| 82 | 56 Electricit | -39.67 | 82 | 56 Electricit | -36.25 |

**Table 5: Percentage deviations in real Consumption by Household type (removal of all subsidies)**

| Household type | % change 2017 | % change 2025 |
|---|---|---|
| 1 H1_JOR | 0.36 | 1.91 |
| 2 H1_NJOR | -2.92 | -0.45 |
| 3 H2_JOR | 0.06 | 1.65 |
| 4 H2_NJOR | 1.14 | 2.24 |
| 5 H3_JOR | -0.02 | 1.59 |
| 6 H3_NJOR | -2.35 | -0.07 |
| 7 H4_JOR | 0.11 | 1.69 |
| 8 H4_NJOR | -3.10 | -0.46 |
| 9 H5_JOR | 0.59 | 2.07 |
| 10 H5_NJOR | -2.52 | -0.15 |
| 11 H6_JOR | 0.09 | 1.67 |
| 12 H6_NJOR | -1.28 | 0.60 |
| 13 H7_JOR | 0.34 | 1.86 |
| 14 H7_NJOR | -2.26 | -0.02 |
| 15 H8_JOR | 0.44 | 1.95 |
| 16 H8_NJOR | 0.63 | 1.87 |
| 17 H9_JOR | 1.11 | 2.47 |
| 18 H9_NJOR | -0.38 | 1.16 |
| 19 H10_JOR | 2.64 | 3.66 |
| 20 H10_NJOR | 4.36 | 4.71 |

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# APPENDIX: INDUSTRIES AND HOUSEHOLDS IN JORGE

**Table A1: Short and long names for industries in JorGE**

| | Long name | Short name | | Long name | Short name |
|---|---|---|---|---|---|
| 1 | Vegetables | Vegetable | 42 | Other Non- Metallic Minerals | OthNonMet |
| 2 | Fruits | Fruits | 43 | Iron and Steel Industry | IronSteel |
| 3 | Crops & Other Agriculture | Crops | 44 | Non Ferrous Metal Industry | NonFerMet |
| 4 | Livestock's & Livestock's Products | Livestock | 45 | Basic Metals Products | BasMetPrd |
| 5 | Poultry and Eggs | Poultry | 46 | Structural Metals Products | StrMetPrd |
| 6 | Fishing | Fishing | 47 | Fabricated Metal Products | FabrMetPrd |
| 7 | Crude Oil & Natural Gas | OilGas | 48 | Machinery and Equipments | MachEquip |
| 8 | Mining | Mining | 49 | Domestic Appliances | DomAppl |
| 9 | Quarrying | Quarrying | 50 | Electrical Machinery | ElecMach |
| 10 | Meat & Fish Products | MeatFisPrd | 51 | Engineering Instruments | EngInst |
| 11 | Olive Oil & Other Oils | OliveOils | 52 | Motor Vehicles Bodies, Trailers | MotVehicle |
| 12 | Dairy products | DairyPrd | 53 | Other Transport Equipments | OthTransEq |
| 13 | Grain mill products | GrainPrd | 54 | Jewelery | Jewelery |
| 14 | Prepared Animal Feed | AnimalFeed | 55 | Other Manufacturing Industries | OthManuf |
| 15 | Bakery Products | BakeryPrd | 56 | Electricity | Electricit |
| 16 | Sugar & Confectionery | SugarPrd | 57 | Water Supply | WaterSup |
| 17 | Other Food Products | OthFoodPrd | 58 | Construction | Construct |
| 18 | Soft Drink Beverages | SoftDrinks | 59 | Trade | Trade |
| 19 | Alcoholic Drinks | Alcohol | 60 | Hotels & Restaurants | HotelRest |
| 20 | Tobacco Products | TobaccoPrd | 61 | Road Transport | RoadTrans |
| 21 | Textile Industry | Textiles | 62 | Rail Transport | RailTrans |
| 22 | Carpets | Carpets | 63 | Pipelines transport | PipelinTrn |
| 23 | Clothing | Clothing | 64 | Sea Transport & Ports | SeaTrans |
| 24 | Leather products | LeatherPrd | 65 | Air Transport | AirTrans |
| 25 | Footwear | Footwear | 66 | Services Incidental to Transport | TransSve |
| 26 | Wood Products Except Furniture | WoodPrd | 67 | Storage & Warehousing | Storage |
| 27 | Furniture | Furniture | 68 | Travel, Tour Operators Services | TravelSve |
| 28 | Paper & Paper Products | PaperPrd | 69 | Postal Services | PostalSve |
| 29 | Printing & Publishing | PrintPub | 70 | Telecommunication Services | TeleComSve |
| 30 | Refinery & Refined products | RefinedPrd | 71 | Information Technology | ICT |
| 31 | Fertilizers & Insecticide | Fertiliser | 72 | Banking Sector | Banking |
| 32 | Paint Industry | Paint | 73 | Insurance | Insurance |
| 33 | Pharmaceuticals products | PharmaPrd | 74 | Other Financial Sector | OthFinSve |
| 34 | Soap and Detergents | SoapDeter | 75 | Business Services | BusineServ |
| 35 | Other Chemical Products | OthChem | 76 | Real estate | RealEstate |
| 36 | Rubber products | RubberPrd | 77 | Ownership of Dwellings | Dwelling |
| 37 | Plastics products | PlasticPrd | 78 | Education | Education |
| 38 | Cement Industry | Cement | 79 | Health Services | HealthServ |
| 39 | Bricks, articles of cement concrete | Bricks | 80 | Public Admin. and Defense | PubAdmnDef |
| 40 | Cutting Shaping Finishing Stone | CutStone | 81 | Others Services | OtherServ |
| 41 | Manufacture of Glass and Clay | GlassClay | 82 | Re-exports | ReEXP |

**Table A2: Household types in JorGE**

| | Long name |
|---|---|
| 1 | Household decile 1 -Jordanian |
| 2 | Household decile 1 - Non Jordanian |
| 3 | Household decile 2 -Jordanian |
| 4 | Household decile 2 - Non Jordanian |
| 5 | Household decile 3 -Jordanian |
| 6 | Household decile 3 - Non Jordanian |
| 7 | Household decile 4 -Jordanian |
| 8 | Household decile 4 - Non Jordanian |
| 9 | Household decile 5 -Jordanian |
| 10 | Household decile 5 - Non Jordanian |
| 11 | Household decile 6 -Jordanian |
| 12 | Household decile 6 - Non Jordanian |
| 13 | Household decile 7 -Jordanian |
| 14 | Household decile 7 - Non Jordanian |
| 15 | Household decile 8 -Jordanian |
| 16 | Household decile 8 - Non Jordanian |
| 17 | Household decile 9 -Jordanian |
| 18 | Household decile 9 - Non Jordanian |
| 19 | Household decile 10 -Jordanian |
| 20 | Household decile 10 - Non Jordanian |