Abstract

This paper aims to estimate the margin of employment elasticity in Jordan with regard to some macroeconomic variables: the gross domestic product, capital expenditure, and current expenditure. Elasticity is measured using two ways, the simple arc calculation, and the econometric model using annual time series data for the period (1980-2014). Data is analyzed by using proper economic modelling and proper diagnostics for stationarity and spurious regression. Based on the tests results, cointegration analyses are applied. Results confirm the existence of the long-run equilibrium relationship between employment and GDP. It was found to be positive that employment responds to changes in GDP growth by a value of 0.48. Results also show that elasticity of employment to capital and current expenditures are both positive in favour of the capital expenditure (0.77) compared to (0.54). This provides clear evidence that capital accumulation and current expenditure could be used as tools to increase employment in Jordan by increasing jobs created in the economy and spurring the aggregate demand in Jordan.

Keywords: employment, elasticity, GDP, current expenditure, capital expenditure.

الملخص

تهدف هذه الدراسة إلى تدقيق قيمة مرونة التشغيل في الأردن بالنسبة لعدد من المتغيرات الاقتصادية الكلية، بما فيها الناتج المحلي الإجمالي، والإفادة الجبالة، والإفادة الرأسمالية وذلك للفترة (1980-2014). وسيتم تقدير المرونة بطريقة استنادًا إلى النظرية الاقتصادية: الأولى حساب المرونة بطريقة الرياضية المعروفة اقتصاديا، والثانية من خلال نموذج قياسي يتضمن المتغيرات قيد البحث. بحيث يتم إجراء الاختبارات الأساسية للسلاسل الزمنية، من ضمن اختبار الاستقرار لتجنب وجود الارتباط الوعي، ومن ثم سيتم الكشف عن وجود علاقة طويلة الأجل باستخدام نموذج التكامل المشترك. وقد أُكدت نتائج الدراسة وجود علاقة طويلة الأجل بين عدد المشغلين والنتائج المحلي الإجمالي، كذلك بين التشغيل والإفادة الرأسمالية والإفادة الجبالة ويتم موجبة.

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1.1) Introduction:

Unemployment is one of the critical macroeconomic problems that any economy suffers. This phenomenon is highly related and affected by many economic factors, of them the economic growth. Jordan, as other countries, is one of high values of unemployment rates among other countries, it exceeded 18% for 2017. Unemployment is also very high among youth that exceeded 30% with a large variance between men and women in the labour market, (14.7% for males compared to 31.2 for females). (Department of Statistics, 2017).

One of the main reasons for the high unemployment in Jordan is the mismatch between demand and supply in the labour market, which means different employment policies and education policies are not aligned to gather, in addition to the rapid increase in the number of graduates and the expansion of education (Assaad, 2014). The case is not different from other neighboring countries; mismatch is an economic factor that affects unemployment – response to economic factors in many Middle East and North Africa (MENA) countries (Dadush, 2019).

Needless to say that high economic growth is one of the tools that may help countries mitigate the impact of high unemployment or increase employment by creating more jobs in the market. Jordan faced a declining rates of employment growth due to a slowdown in economic growth, in addition to an increasing rate of migrant workers employment. (Assaad and Salemi, 2018). The economic situation in Jordan and the regional security crisis also make the situation in the labour market more challenging (Razzaz, 2017).

The relation between employment and economic growth is measured by the term elasticity, which measures the responsiveness of employment to changes in the economic growth, in other words the percentage change in the number of employed persons in an economy associated with a percentage change in economic output, measured by gross domestic product (Borjas, 2016).

Different policies in Jordan have tackled this issue, of them; the national employment strategy (NES) that has been formulated by the ministry of labour- in a close cooperation with a group of experts from different sectors. This strategy incorporates many joint projects on the overall macroeconomic level in general in addition to labour market specific projects. Jordan 2025 is also considered as one
of the comprehensive economic plans that tackled the issue of high unemployment and its relation to economic growth. The Human Resource Development strategy (HRD) is also an important strategy that represents a great linkage between labour market and education pillars.

According to NES, spurring economic growth is a main engine to mitigate the impact of unemployment in Jordan by having different economic models and providing different sectoral analysis. NES has been reviewed by the ministry of Labour and the international Labour organization (ILO), in this review estimation for employment elasticity in Jordan has been conducted showing a value between (0.4-0.5) as an average for the period (2000-2014). (the National Employment Strategy, 2014).

Giving the moderate economic growth that Jordan has suffered during the past decades that did not exceed 2% in 2016 compared to a growth of 2.4 percent in 2015(Central Bank of Jordan annual report, 2016).(1) The problem has been fueled, Mainly after the Syrian crisis and the high influx of refugees Jordan has received, all put huge burden on economic performance not only on labour market, but also on other sectors and on overall economic indicators. Never forgot to shed the light on the high number of migrant workers in Jordanian labour market and the large amount they capture from the overall jobs available in the market. As according to ministry of labour data base, the number of legal work permits from overall nationalities has reached 340,995 for 2017 comparing to the annual net created jobs in the labour market of around 50,000. (50,853 jobs for 2016) (Department of Statistics, 2017). During the past years, unemployment rose rapidly, while GDP remained relatively moderate with very low economic growth.

One of the ways to mitigate the impact of high unemployment is spurring economic growth in any economy by having more investment and creating more jobs in the market, capital investment may help expanding the size of available jobs in the market by widening the size of "labour market pie" in any economy. Employment is also affected by other macroeconomic variables such as the aggregate expenditure. According to the Kenyzzian theory, aggregate demand reflected by aggregate expenditure can spur economic growth which in turns lead to increase in the employment size in the economy (Case, et al,2014).
Aggregate expenditure as whole in Jordan has increased rapidly during the past period, same pattern is followed by the current expenditure whereas the capital expenditure has been showing a fluctuating pattern. Giving all the facts above, it is highly needed to investigate how the Jordanian labour market responds to changes in economic performance. In other words, to assess the relation of employment to economic growth from one side, and whether employment size is affected by the current and capital expenditures from the other side.

1.2) Literature review.

The subject of what determines employment elasticity as first step and what is the margin of this elasticity as a next step has been tackled by many economic studies. Employment elasticities serve as a useful way to examine how growth in economic output and growth in employment evolve together over time. The basic definition of employment elasticity is the percentage change in the number of employed persons in an economy or region associated with a percentage change in economic output, measured by gross domestic product (Kapsos, 2005).

Starting from Okun’s law (1962), the law describes the empirical relationship between changes in output and changes in the unemployment rate. It states that, for each 2% fall in real GDP below its trend, one can note a 1% increase in the unemployment rate. Following this concept, (Schillings, 2018) tried to estimate Okun’s law in some countries including Jordan, the results show that Jordanian unemployment is expected to be reduced by (0.108) percentage points following on a 1 percent increase in GDP.

Some of the previous literature tried to investigate the determinants of elasticity; According to (Daly and Hobijn, 2010) there are other hidden relationships that influence output-employment relations, of the them the components of GDP including number of workers, the hours they work, and the efficiency with which they produce output. (Chang, 2007) concluded that other factors should be studied to analyze the labour market elasticity such as technology and wages. Employment is also affected by fluctuations in business cycle, (Basu and Foley, 2013) noted that employment elasticity in the US economy is not fixed; it varies across the business cycle periods from the downturn and recovery phases.
Other studies measure the elasticity in different countries and different levels inside the economy; (Islam and Nazara, 2000) used province-level employment/GDP data for Indonesia found that the estimates vary from a low of 0.49 (non-econometric method) to a high of 0.66 by using econometric method. In India and US, (Deepankar and Das, 2015) measured employment elasticity by the decompositions of both the level and change of aggregate employment elasticity in terms of sectoral elasticities, relative growth and employment shares. (Seyfried, 2006) found that the employment elasticity ranged between (0.31-0.61) in some states.

For Middle east and north africa region, (Kapsos, 2005) in his employment strategy paper utilizes different levels of data sets to provide country, regional and global estimates of the employment intensity on general level in addition to different demographic groups such as women and youth for some sectors for more than 160 economies. The value for elasticities in the region were of the highest of the world, they reached an approximate value of unity compared to (Crivelli et al., 2012) estimates for elasticity that was approximately 0.25 for the same region.

Other Micro level studies tried to estimate elasticities in some specific sectors, (Padalino and Vivarelli, 1997) ,(Piacentini and Pini, 2000), (Adam and Motous, 2014), (Abdul karim and Yin Yin, 2015), whereas (Nazier, 2017) is one of the previous studies that studied labour demand elasticities from other perspectives such as elasticity to wages and skill levels. As an application to kenzyian theory on sectoral level, (Antonio and Soria, 2019) studied the responsivness of Job creation to expenditure in tourism sector and reached to the point that tourism expenditure may result in increases in tourism employment.

For Jordan specific estimation, different studies reached to relatively similar estimations for elasticity. International monetary fund (IMF) country report for 2014, estimated employment elasticity to real GDP in Jordan at 0.55 (International monetary fund report, 2014). (Bashier and Wahban, 2013) found that10% increase in real Gross Domestic Product caused a 7.2% increase in employment level and (Abdulrazag and Wahban, 2013) showed that a 10% increase in real Gross Domestic Product caused a 6.78% increase in employment level, whereas the employment elasticity with respect to real foreign direct Investment reached a low
level of (0.267). (Slimane, 2015) tried to assess the determinants of cross-country variations in employment elasticities of 90 countries including Jordan, results found that Elasticity estimates vary considerably across countries and that the value for Jordan reached (0.664).

From another point of view, the Jordan strategy forum (JSF) shows that Jordan has experienced periods of high economic growth without corresponding improvement in unemployment due to growth in some capital-intensive sectors or some foreign workers employing sectors (Jordan Strategy Forum, 2016).

Looking from another angle for elasticity of creating jobs, International Trade Centre highlighted the point that creating more jobs in the Jordanian economy could be enhanced by encouraging trade. As a result, Jordan could create more than 85,000 new jobs by increasing its regional trade potential (International Trade Centre, 2018).

In this paper, elasticity will be measured in two ways as mentioned previously and results of this estimation will be compared to the previous analysis on both country and regional levels.

1.3) Data model and methodology.

This study aims at estimating the GDP-employment elasticity, current expenditure- employment elasticity and capital expenditure -employment elasticity in Jordan.

Estimates of the margin of employment elasticity in Jordan will be provided in two ways: the direct mathematical calculations commonly used in economics as "arc elasticity" and previously mentioned in previous literature, and then the econometric model. In order to measure employment elasticity in Jordan for the two ways, annual data cover the period (1980-2014) is used. Output is measured by using GDP figures obtained from the central bank of Jordan. Number of employed persons is obtained from different sources: the department of statistics (DoS), national center for human resource development (NCHRD), and the World Bank and ILO online databases.

To calculate the arc elasticity, the following equation will be used:

\[ e = \frac{\Delta LL}{\Delta Y/Y} \]

(1)
Where:

\( (e) \) stands for elasticity, the per cent change of employment for every one per cent change of GDP while \( (L) \) denotes labour/employment size and \( (Y) \) for output measured by GDP.

Depending on this equation, one can only measure the arc elasticity, meaning that the elasticity computed is between two different points in time, rather than point elasticity. Nazara and Islam (2000) have clarified that arc employment elasticities tend to exhibit a sign of instability and may therefore be inappropriate for comparative purposes. Thus, the alternative way to measure elasticity is the econometric side by using the log linear equation as follows:

\[
\ln L = \beta_0 + \beta_1 \ln Y
\]

(2)

Where \( \beta_1 \) measures the employment elasticity - as a commonly known in economics - for this type of equations.

To test for the responsiveness of employment to current and capital expenditure; same model will be used; the output will be replaced by two types of expenditure as follows:

\[
\ln L = \beta_0 + \beta_1 \ln \text{CAP}
\]

(3)

\[
\ln L = \beta_0 + \beta_1 \ln \text{CUR}
\]

(4)

Where \( \text{CAP} \) donates the capital expenditure, \( \text{CUR} \) stands for current expenditure; \( \beta_1 \) represents employment elasticity for each of capital expenditure and current expenditure. Data for the two variables are obtained from central bank of Jordan annual time series.

**Methodology:**

To calculate the arc elasticity (1), data is computed by using excel for each of the macroeconomic variables; GDP, CUR, and CAP, for equations (2), (3) and (4), data is analyzed by using Eviews program. Needed actions are performed for the data analysis starting with the stationarity test that is essential for removing any spurious relation, cointegration test is also applied before performing the regression analysis.

1.4) **Empirical results**

This section presents the results of the two alternative methods in estimating
the elasticity of employment for both the standard formula that enables the estimation of "arc elasticity" and the presentation of results based on econometric estimates for the equations 2,3 and 4.

1.4.1) Arc elasticity results.

Table below shows the results of the three types of "arc elasticities":

<table>
<thead>
<tr>
<th></th>
<th>value</th>
<th>Max</th>
<th>min</th>
</tr>
</thead>
<tbody>
<tr>
<td>e GDP</td>
<td>0.72</td>
<td>2.67</td>
<td>-0.14</td>
</tr>
<tr>
<td>e CUR</td>
<td>0.21</td>
<td>6.29</td>
<td>-6.80</td>
</tr>
<tr>
<td>e CAP</td>
<td>1.17</td>
<td>11.96</td>
<td>-0.07</td>
</tr>
</tbody>
</table>


The average value for employment elasticity to GDP for the mentioned period shows the value of 0.72, the highest value reached 2.67 and the minimum was negative showing a value of 0.14.

For employment elasticity to current expenditure shows a value of 0.21 with a fluctuating trend till 1997 as shown in the figure (1). A less fluctuating trend for employment elasticity to capital expenditure is shown in the figure (3) with a higher value of around 1.17 for the whole period.\(^{(2)}\)

To benchmark the results of Jordan with other countries, other calculations for employment elasticity to GDP\(^{(3)}\) were performed for a sample of other Arab countries depending on World Bank, ILO datasets as shown below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Jordan</th>
<th>Egypt</th>
<th>UAE</th>
<th>Kuwait</th>
<th>Qatar</th>
<th>KSA</th>
<th>Lebanon</th>
<th>Tunisia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elasticity</td>
<td>0.50</td>
<td>0.68</td>
<td>0.76</td>
<td>0.38</td>
<td>0.49</td>
<td>-1.06</td>
<td>0.32</td>
<td>0.64</td>
</tr>
<tr>
<td>Average</td>
<td>0.34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average GCC</td>
<td>0.144</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average GCC without KSA</td>
<td>0.545</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average non-GCC</td>
<td>0.536</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (2): employment elasticity to GDP (arc) in some Arab countries, values are calculated based on world bank and ILO online databases.
Estimating Employment

Raghda Alfaouri

Figure (1): Employment elasticity to GDP (arc) in some Arab countries, values are calculated based on world bank and ILO online databases.

Table (2) above and corresponding chart (1) show positive values for the sample countries except for Saudi Arabia, the highest amount shown is in UAE and the lowest is in Lebanon, the average reached a value of 0.34. (4)

To distinguish between GCC and Non GCC countries, the right side of the chart shows a small difference between the values of the two groups (after excluding the negative value for KSA), average for the former reached 0.55 compared to 0.54 for the non-GCC sample.

1.4.2) Econometric estimates.

Many economic time series may be non-stationary on their level and need to be differenced until reaching stationary level, this stationarity test (unit root test) is performed by using the Augmented Dickey Fuller (ADF) for the variables of interest and then cointegration of the variables is tested using Johansen method. Cointegration means that despite being individually nonstationary, a linear combination of two or more time series can be stationary.
Table (3): Unit Root Test Results:

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF(level)</th>
<th>ADF (first difference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNEMP</td>
<td>-1.218124</td>
<td>-3.02725 **</td>
</tr>
<tr>
<td>LNGDP</td>
<td>-1.09636</td>
<td>-4.38009 ***</td>
</tr>
<tr>
<td>LNCUR</td>
<td>-0.38659</td>
<td>-4.38009 ***</td>
</tr>
<tr>
<td>LNCAP</td>
<td>-1.04073</td>
<td>-7.66347 ***</td>
</tr>
</tbody>
</table>

The *, **, and *** indicate rejection the null hypothesis of unit root at 10%, 5%, and 1% significant levels, respectively.

Based on the ADF test, LnEMP, LnGDP, LnCUR and LnCAP were all found stationary at their first differences and not on their level.

Conintegration analysis.

The results of trace and maximum values tests are reported in table below, they show the rejection of the null hypothesis of no cointegration at 5% level. In this case, LNEMP and LNGDP are cointegrated and this confirms the existence of long run relation between the employment and GDP in Jordan.

Results also show that LNEMP is also cointegrated with each of LNCAP and LNCUR

Table (4): Johansen Cointegration Test Results for GDP

<table>
<thead>
<tr>
<th>Trace test:</th>
<th>Trace Statistic</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>26.21525</td>
<td>15.49471 **</td>
</tr>
</tbody>
</table>

Maximum Eigenvalue test

<table>
<thead>
<tr>
<th>Max-Eigen Statistic</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>20.9824</td>
</tr>
</tbody>
</table>
Table (5) Johansen Cointegration Test Results for CAP.

<table>
<thead>
<tr>
<th>Trace test:</th>
<th>Trace Statistic</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>24.45028</td>
<td>15.49471</td>
</tr>
<tr>
<td>Maximum Eigenvalue test</td>
<td>Max-Eigen Statistic</td>
<td>5% critical value</td>
</tr>
<tr>
<td>None *</td>
<td>20.74941</td>
<td>14.26460</td>
</tr>
</tbody>
</table>

Table (6) Johansen Cointegration Test Results for CUR.

<table>
<thead>
<tr>
<th>Trace test:</th>
<th>Trace Statistic</th>
<th>5% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td>18.48173</td>
<td>15.49471</td>
</tr>
<tr>
<td>Maximum Eigenvalue test</td>
<td>Max-Eigen Statistic</td>
<td>5% critical value</td>
</tr>
<tr>
<td>None *</td>
<td>14.28707</td>
<td>14.26460</td>
</tr>
</tbody>
</table>

Estimated coefficients:

Table (7) below shows the estimation for employment elasticities to GDP, CAP and CUR:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model elasticity</th>
<th>arc</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.48 ***</td>
<td>0.50</td>
</tr>
<tr>
<td>CUR</td>
<td>0.54 ***</td>
<td></td>
</tr>
<tr>
<td>CAP</td>
<td>0.77 ***</td>
<td></td>
</tr>
</tbody>
</table>

Table (7): estimation results for employment elasticities to GDP, CAP and CUR in Jordan.

Employment elasticity to GDP in Jordan is estimated at 0.48, which means a 1 per cent increase in GDP tends to increase the employment by the half per cent, the elasticity values for both the current expenditure and capital expenditure are positively estimated to be around 0.54 and 0.77 respectively.

Results for employment elasticity to GDP are found to be similar to previous estimation for Jordan as mentioned in the NES and IMF reports. Results also
show that elasticity of employment to capital and current expenditures are positive in favour of the capital expenditure (0.77) compared to (0.54). This provides clear evidence that capital accumulation in Jordan tends to increase employment in Jordan by increasing the investment size and thus increases the jobs created in the economy. Current expenditure also helps in mitigating the impact of the high unemployment through spurring the aggregate demand in Jordan that leads to create more jobs in the economy in turn based on the fact that demand for labour is derived from the demand of production in goods market. Elasticity of capital expenditure is expected to be higher than the current due to the direct impact capital expenditure creates on labour market, whereas current expenditure impact goes in to different steps through spurring economy as a first step that may in turn cause positive effect on employment depending on the rigidity/ responsiveness of the overall market to absorb such changes.

Conclusion:

The main objective of this paper is to estimate the elasticity of employment to each of GDP, Current expenditure and capital expenditure in Jordan. Estimation follows two types as according to principles of economic theory and previous literature: direct mathematical calculation (arc) elasticity, and empirical estimation (point) elasticity depending on annual time series data cover the period 1980:2014.

To remove the possible impact of spurious effect between variables, proper diagnostics were performed for the stationarity of the variables depending on ADF tests, and the then cointegration regression (the Johansen cointegration) test is performed. Results confirm the existence of the long-run equilibrium relationship between employment and GDP. It was found to be positive that employment responds to changes in GDP growth by a value of 0.48. In other words, increases in GDP growth by one per cent tend to increase employment by around 0.50 percent. Or, if decision makers target increasing employment by 1 per cent; GDP should grow by 2percent. Moreover, results show the confirmation of long-run relationship between employment and each of capital expenditure and current expenditure. Comparing the results to the arc calculations, it is found
that there are some differences in the values, but with similar trend. This finding could be used to provide evidence for policy makers that mitigating the impact of high unemployment in Jordan could be done by increasing investment size and enlarging the size of jobs created in the economy. This result is consistent with what has been mentioned by previous governmental policies related to labor market. It also confirms the impact of the aggregate demand theory on spurring economic growth that leads in turn to creating more jobs in the economy.

**Recommendations:**

One of the important purposes for conducting empirical studies is to provide evidence-based policy recommendations, so policy makers can base their decision on concrete findings.

According to the results of this study, Jordanian government could mitigate the impact of high unemployment by finding the proper "engines" for economic growth by expanding investment opportunities that -in turn- could help in creating more jobs in the market. This could be achieved by providing attractive incentives for investors in Jordan and having an investment –enabling environment. More stability in rules and regulations managing investment could also help in this regard.

Encouraging aggregate expenditure is also important for the government of Jordan, by which it spurs aggregate demand that –in turn- tends to create more jobs in the economy. In this context, specific revision for the taxation policy is essential to expand disposable income for individuals and encourage businesses environment.

**Notes:**

(1) As according to the World Economic Situation and Prospects 2018, the united Nations estimated the growth rate for GDP in Jordan to reach 2.9 for 2019. (United Nations, 2018).

(2) See annex (1).

(3) Comparison is limited for employment elasticity to GDP due to some difficulties in finding the needed data for the sample countries related to both
current and capital expenditures in a unified proper approach. GDP is taken in real values.

(4) Kapsos, (2005) Global employment elasticities estimation reached on average (0.34) for the three periods (1991-1995, 1995-1999, 1999-2003) with some variance between regions: western Europe (0.29), North America (0.45), East Asia (0.15), Middle east (1.1), North Africa (0.51)).

References:
Estimating Employment ........................................ Raghda Alfaouri

16- Department of statistics, several labour force surveys. http://dosweb.dos.gov.jo/labourforce/


30- Okun, M. (1962)." Potential GNP, its measurement and significance". Cowles Foundation, Yale University.


Estimating Employment

Raghda Alfaouri

Annex (1)

Figure (1): employment elasticity to GDP using arc calculation for Jordan (1980-2014).

Figure (2): employment elasticity to current expenditure.
Figure (3): employment elasticity to capital expenditure.