Stock markets and economic growth in oil exporting countries: evidence from Kuwait.

Bentour, El Mostafa

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El Mostafa Bentour, the Arab Planning Institute, Kuwait
Email: embentour@gmail.com

ABSTRACT:

This paper empirically investigates the role played by the Kuwait stock market on the real sector. It uses useful steps and techniques to set up a regression based on the Mankiw-Romer-Weil model to answer whether there is an eventually positive effect of the stock market developments on the real economy. The results show a positive impact of the market capitalisation on the Gross Domestic Product. The elasticity of the market capitalization to GDP is around 0.17. This impact is also confirmed by an autoregressive vector model via estimation and impulse response functions on both total and non oil GDP.

Key Words: Non oil GDP, Market Capitalization, Cobb-Douglas, Human Capital.

INTRODUCTION

The theoretical literature on the role of the financial sector on economic growth and its implications in the different stages of development has been widely discussed in recent years[1]. However, it is interesting to note that the tendency of this literature has not remained consistent over time. Thus, empirical investigation is becoming the main tool to assess for each country or a group of countries, the role of financial sector on the real economic activity. Recently, stock markets, as part of the whole financial system, are growing fast to compete the role of the banking intermediation to spread savings among investors. This benefit role could be offset by the instability characterizing the stock market and leading to negative repercussions on the real economy (Winkler, 1998).

Stock market variables are very volatile inducing an uncertainty around the investors' expectations and increasing the risk. A connexion between the real sector and stock exchange market transmits the market developments to the real economic activity. Data on Kuwait Stock Exchange shows that market capitalization is 16 times volatile than GDP[2]. This paper present a simple methodology based on Cobb-Douglas production function to investigate the role played by the Kuwait stock market on the real sector. It uses useful steps and techniques to set up a regression based on the Mankiw-Romer-Weil model to answer whether there is an eventually positive effect of the stock market developments on the real economy. The results show that the stock market has a positive impact on the economic activity.

In what follows, we first describe the model. Second, we present data methodology construction. In the third section we present and discuss results. The fourth section is for a VAR model estimation to support the Mankiw-Romer-Weil model results and then we conclude.

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[1] See, for example, Levine (2005) and Beck (2009) for a survey of the theoretical and empirical literature.

[2] The Variance of market capitalization over the variance of GDP is 16.05 for the sample 1993-2012.

1. DESCRIBING THE MODEL

The methodology of the paper follows the same one as in Arusha (2010) applied to Kuwait stock market series data. It examines the influence of the stock market on the real economy by extending the Mankiw-Romer-Weil model (1992) to incorporate a stock market variable on it. The model starts from a Cobb-Douglas production function form, linking the output level Y to the physical capital K and labour L as inputs:

$$Y_t = A.K_t^{\alpha}.L_t^{\delta} \quad (1)$$

Where A is the total factor productivity term and; α and δ represent the shares of physical capital and labour respectively. Augmenting the model by introducing two other inputs, human capital H and the stock exchange market variable S, the model becomes:

$$Y_t = A.K_t^{\alpha} H_t^{\beta} S_t^{\gamma}.L_t^{\delta} \quad (2)$$

Where β and γ are the shares of the human capital and market capitalization. Scaling the model according to labour (dividing by L) and rearranging, then introducing the natural logarithm, we have the following equation:

$$Log(Y_t / L_t) = c + \alpha.Log(K_t / L_t) + \beta.Log(H_t / L_t) + \gamma.Log(S_t / L_t) + \mu.Log(L_t) \quad (3)$$

Where $c = Log(A)$, is a constant term and $\mu = \alpha + \beta + \gamma + \delta - 1$ captures the deviation from constant returns to scale. Putting small capitals to design scaled variables we rewrite the precedent equation as:

$$Log(y_t) = c + \alpha.Log(k_t) + \beta.Log(h_t) + \gamma.Log(s_t) + \mu.Log(L_t) \quad (4)$$

This form allows interpreting directly the parameters as elasticities and measures the impact of the inputs on the output. Our objective is to assess, for the Kuwait, the relationship between the stock market variable and the level of the economic activity; the Gross Domestic Product.

2. DATA CONSTRUCTION

To estimate the previous equation, we should have on our possession data for GDP, capital stock, human capital, Market capitalization as a proxy for the stock variable and labour. We use World Development Indicators (WDI) to have GDP, Labour and market capitalization. However, the capital stock and human capital are not observed. We constructed the capital stock according to the equation:

$$K_t = (1-\delta)K_{t-1} + I_t \quad (5)$$

It simply means that, the current stock is generated as the past one K_{t-1} depreciated by some amount $-\delta K_{t-1}$ and augmented by the current flow of the investment I_t. δ is a depreciation rate assumed equal 6% and the first value $K_0 = 2.5 * GDP$. Market capitalization is observed since 1984, the official date where the Kuwait Stock Exchange becomes reorganized in an official body. The flow of investment is Gross Capital Formation (GCF) from WDI database. As we do not have sufficient long time series for real GCF, we use the GDP deflator to have real GCF from nominal values. For missing values for 1990-1992, we use simple linear extrapolation to fill the gap.

Human capital is approached as the average years of schooling derived from the gross enrolment school as percent of population aged 15 and over for primary, secondary and tertiary schooling. Barro and Lee have constructed a large database for 146 countries, including Kuwait, from 1950 till 2010, by sex and by 5 years intervals (www.barrolee.com). We use linear extrapolation to fill in the gap in order to display a complete time series of human capital.

3. ESTIMATION

The model is implemented in EViews. The market capitalization used to test the relationship between GDP and the KSE market is available only from 1988 till 2010, with two missing values for 1990 and 1991. We handled the probelem by using backward extrapolation for the period 1980-1987 and forward extrapolation for the two precedent years.

The estimation is in log level and not in differences although the variables are not stationnary. This approach is deffended for the fondamental following reason. The relationship between finance and growth is rather a long run relationship than short run. In econometrics and statistcis, the long run is seen to be the common economic trend of the data in level, while the short run is the volatility of the growth rate series. However, running regressions in general is governed by a lot of probability laws and hypothesis to check. Statistical tests are used to assess the quality of the estimated model.

Table 1 shows long run (levels) and short run (growth rates) correlation matrices. There is an important positive correlations between total GDP, non oil GDP and market capitalization in levels (about 80%). In growth rates, the correlations are still positive but weaker. However, the correlation is only an indication of statistical linkages and does not mean causality. The causality issue is discussed in the fourth section.

Table 1: Varibales matrice Correlations in levels and growth rates.

Sample 1993-2012	Correlations in levels		
	Total GDP	Market Capitalization	Non Oil GDP
Total GDP	1.00	0.82	0.86
Market Capitalization	0.82	1.00	0.74
Non Oil GDP	0.86	0.74	1.00
Sample 1993-2012	**Correlations in growth rates**		
	Total GDP	Market Capitalization	Non Oil GDP
Total GDP	1.00	0.14	0.13
Market Capitalization	0.14	1.00	0.30
Non Oil GDP	0.13	0.30	1.00

The econometric model to estimate is the equation (4) in the precedent section augmented by an error term:

$$Log(y_t) = c + \alpha.Log(k_t) + \beta.Log(h_t) + \gamma.Log(s_t) + \mu.Log(L_t) + \varepsilon_t \qquad (5)$$

Where $\varepsilon_t = N(0,\sigma_0^{\ 2})$ is a processus supposed to have a gaussien processus properties where the mean equal 0, the variance independent of time (normal and identically distributed), or also what is called white noise processus. I run two regressions: the unrestricted specification which is equation (5) and in case of the nullity of the parameter μ, the equation exibit a constant returns to scale. Under this assumption; $\mu = \alpha + \beta + \gamma + \delta - 1 = 0$, we have $\delta = 1 - \alpha - \beta - \gamma$. We re-estimate the new specification and call it restricted specification. The two specifications are estimated for the two samples: 1980-2012 and 1993-2012 and the results are shown in the table 2.

The residuals of the estimations suggest to correct the effect of the observations around 1990 and 1991. For this purpose, we construct a dummy variable that we used to offset the effect of the war in this period over the variables for the sample 1980-2012.

The estimation results confirm that market capitalization have a postive impact on the real GDP level for the two specifications and over the whole and reduced samples. The elasticity γ is highly accepted and is, 25.8% and 27.6% for the whole sample (1980-2013) and respectively for the two specifications. Considering the reduced sample 1993-2012 where all the data are observed, the coefficient γ is arround 17%.

The impact of the human capital is rejected; the p-values associated with β are superiors to 5%, which means that there is no effect of human capital on the economic activity. This results should be considered with precaution regarding the method of data extrapolation of human capital. The coeffiecient μ is also rejected in the unrestricted specification. A wald hypothesis test of the nullity of both β and μ confirm the nullity of these coefficients. F-Statistic probabilities are respectively 0.14 and 0.22 for the samples 1980-2012 and 1993-2012. The second column of the table presents a restricted specification ($\mu = 0$) which mean that the Cobb-Douglass production function exibit a constant returns to scale confirmed by the nullity of this coefficient as shwon in the first column.

The third column omit the human capital rejected in the first and second estimation and the overall properties are unchanged over both samples. For all estimations, Durbin-Watson is around 1.60 over 1980-2012 and 1.86 over 1993-2012 indicating the absence of autocorelations especially on the shorter sample where data are not completed by extrapolation.

Table 2: Summary of estimation results

	Unrestricted Specification				Restricted Specification				Restricted Specification without human capital			
Sample	1980-2012		1993-2012		1980-2012		1993-2012		1980-2012		1993-2012	
	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value
α	1.193	0.019	1.045	0.073	0.602	0.028	0.798	0.048	0.549	0.000	0.678	0.000
β	0.759	0.206	-1.377	0.512	-0.043	0.836	-0.080	0.750	NA	NA	NA	NA
γ	0.258	0.000	0.164	0.000	0.276	0.000	0.175	0.000	0.276	0.000	0.174	0.000
μ	1.034	0.097	-1.025	0.574	**	**	**	**	**	**	**	**
Adj. R^2	0.755		0.706		0.745		0.717		0.753		0.732	
SE	0.126		0.050		0.128		0.049		0.126		0.047	
DW	1.67		1.86		1.57		1.87		1.57		1.84	

NA: not applicable since the human capital is omitted from the equation.

** In the restricetd specification, μ is null and $\delta = 1 - \alpha - \beta - \gamma$.

4. VAR MODEL ASSESSMENT

A Vector Auto-Regressive (VAR) model, initiated by Sims (1980) is a system in which each component of the vector explains the dependant variable by its proper past values and the past values of the other variables present in the system. To estimate a VAR model, we first determine the optimal lag to introduce in the model. All the selection criteria concorde about the first lag[3]. Then, a granger causality[4] test is conducted and show that causality run out from market capitalization to both total GDP and non oil GDP (table 3). The opposite direction is rejected at the 5% probability threshold.

[3] Eviews displays five criteria for this purpose: LR test, Final predictor error, Akaike information, Schwartz information and Hannan-Quinn information criterion.

[4] Granger says that X causes Y if the past values of the X help predict Y.

Table 3: Pairwise Granger Causality Tests for Market capitalization and GDP.

Lags = 1		Sample: 1980-2012	
Null Hypothesis:	Obs	F-Statistic	Prob.
LGDP_R does not Granger Cause LS_R	32	0.618	0.438
LS_R does not Granger Cause LGDP_R		9.691	0.004
LNOILGDP_R does not Granger Cause LS_R	32	0.060	0.809
LS_R does not Granger Cause LNOILGDP_R		3.861	0.059

LGDP_R stands for logarithm real GDP, LS_R for real market capitalization and LNOILGDP_R for logarithm real non oil GDP.

Johansen tests reject any relationship of cointegration between GDP (for both total and non oil) and market capitalization. Table 4 presents the output test for both GDP and non oil GDP and market capitalization. It shows that trace test indicates no cointegration at the 5% level according to MacKinnon-Haug-Michelis (1999) p-values. We conclude that the final system between GDP and market capitalization is a standard VAR with one lag.

Table 4: Johansen Cointegration tests

Sample (adjusted): 1981 2012 Trend assumption: Linear deterministic trend				
Market Capitalization, Total GDP	Unrestricted Cointegration Rank Test (Trace)			
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Prob.**
None	0.3212	13.2281	15.4947	0.1067
At most 1	0.0256	0.8302	3.8415	0.3622
Market Capitalization, non oil GDP	Unrestricted Cointegration Rank Test (Trace)			
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Prob.**
None	0.2759	11.5707	15.4947	0.1787
At most 1	0.0492	1.5634	3.8415	0.2112

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

The Cholesky impulse response function reported in the figures 1 and 2 trace the responses generated by the VAR model for each variable to the other variable impulsed by one unit of its standard deviation. Figures show both positive effects. There is no immediate response of the market capitalization to the real GDP. The effect is null in the first year and become more important in the second year then reaches its maximum in the third and fourth years. While, the response of market capitalization to both total GDP and non oil GDP is non null from the first year: there is an immediate effect and this effect is maximal in the second year.

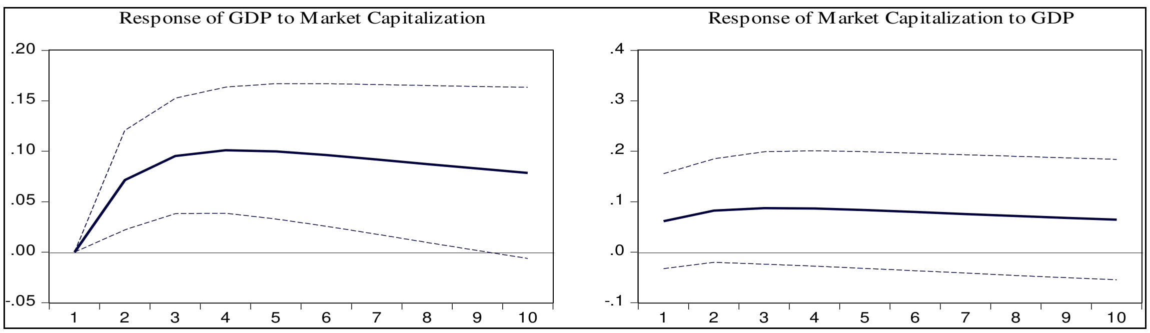

Figure 1: Response Funtcions of the total GDP and Market Capitalization

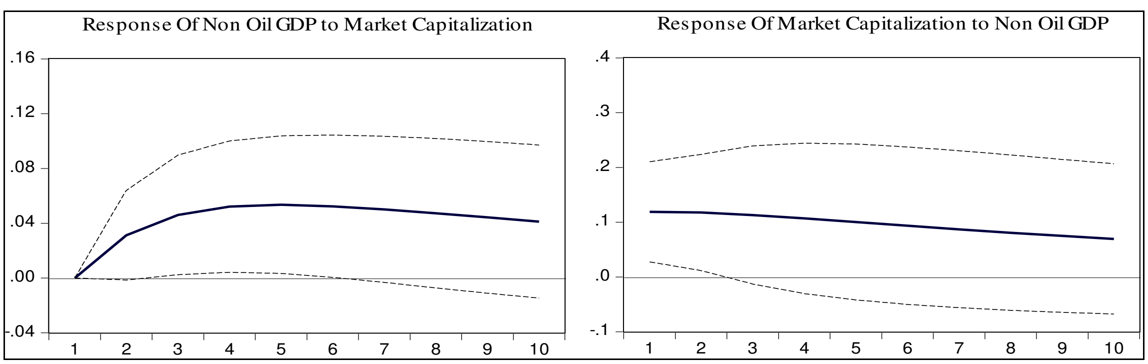

Figure 2: Response Funtcions of the non Oil GDP and Market Capitalization

5. CONCLUSION

We tested in this paper the impact of market capitalization on the economic activity level in the long run. We used for this purpose a model derived from theoretical economic approach and after several tests and estimations, we conclude that there is effectively a positive effect of the stock market exchange over the GDP in Kuwait. The elasticity is on average around 20% meaning that an increase in the stock market capitalization by 1% implies the GDP increase by 0.2%. A standard VAR model also confirm this effect.

However, the results may suffer from the shortcoming of the data and short samples. While the paper present an individual case of an oil exporting country, the work could be extended to panel data over the group of the GCC countries or oil exporting countries.

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