

Domestic versus External Public Debt in Jordan: an Empirical Investigation

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ABSTRACT

The purpose of this study is to investigate the growth implications of public debt in Jordan, disentangling the effects of external and domestic components. The empirical analysis is based on a neoclassical growth model, relying on a Cobb Douglas function with capital, labor, and public debt as independent factors of production. The model has been tested with three different specifications of the variable public debt, namely, total, domestic, and external debt. A Johansen cointegration approach was adopted to test the long run relationship between these variables and economic growth on data series for 1980-2013. On this data set, also Vector Error Correction Model and Granger causality have been tested. The study provides evidence for a negative effect of public debt on economic growth. Further, the negative contribution of domestic debt to economic growth seems to be of similar magnitude than the contribution of external debt.

Keywords: Debt, External Public Debt, Domestic Public Debt, Economic Growth, Jordan.

INTRODUCTION

Budget deficit, public debt, and government borrowing are serious concerns for many countries. In particular, governments face the dilemma between relying on domestic rather than on external sources to finance their budget deficit. Overall, this choice aims at ensuring a stable financing and at minimizing the risk and the cost of public borrowing: even though domestic debt tends to crowd out private investments and, compared to conditional external borrowing, to have higher debt services, foreign debt increases the vulnerability of an economy to external conditions and to changes in the exchange rate.

Most of the studies have been focusing on

developing countries and were (also therefore) mainly concerned with the macroeconomic impact of external debt. Analyses pointing at the macroeconomic implications of domestic debt are still sporadic. The present study aims at empirically investigating the growth effect of public debt, disentangling the growth contribution of its external and domestic components for the case of Jordan. It contributes therewith and integrates the existing literature on domestic sovereign debt.

The choice of Jordan as a case study is motivated by its long standing history of public debt, with the availability of high quality data, and with the changing patterns of public debt in the country. Considering the period from 1980 to 2013, it can be seen that the Jordanian public debt exploded in the 1990s, in response to the financial crisis of 1989 and consequent involvement in comprehensive reforms under the patronage of the international institutions. Since then and until 2000, Jordan has been mainly relying on external sources to finance its debt. After 2000, the government started diversifying and increasing the domestic public

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debt components. These have even become, after 2008, relatively more important than the external sources of public debt financing.

Overall, the analysis predicts a negative growth effect of public debt. This main research hypothesis is corroborated by the results of a Johansen cointegration analysis referred to a neoclassical growth model estimated on annual data series. The results further reveal a similar negative effect of external and domestic sovereign debt.

The paper is articulated as follows: section 2 presents the macroeconomic implications of public debt. Both theoretical and empirical investigations are hereby encompassed. Section 3 adds to the literature review, looking at the debate on external and domestic sovereign debt. Section 4 introduces the case study and presents an overview of the development of public debt in Jordan and points at some of the most urgent challenges faced by the country. Section 5 introduces the empirical analysis and discusses its underlying hypotheses. It further describes the econometric model, the data set, and presents the main results of the econometric estimations. Section 6 concludes deriving some policy suggestions concerning public debt management for developing countries

2. Macroeconomic Perspective of Public Borrowing

In general, public debt arises whenever government expenditures exceed government revenues. This tends to happen more during times of economic and financial difficulties of a country and typically during economic and financial crises. The economic rationale behind that is that governments need to cover their running cost and/ or want to stimulate the economy and promote economic growth to recover from the shortages of the crisis. But debt is costly and needs to be paid back: the main issues are hereby what is the optimal level of debt, whether it has to be spent into capital investment or consumption, and when is the most suitable time to pay

it back without excessively contracting on the economy. The sense of this is to try to maximize the benefits of public debt and minimize its costs. As follows, the main macroeconomic implications of public debt will be reviewed.

In general, economists commonly share the view that even though public debt has expansionary effects in the short run, in the long run it contracts on the economy (Traum and Yang, 2013). In the short run, public debt increases the amount of disposable resources, thus stimulates in a Keynesian perspective, economic growth. But the debt, as it will be paid back at a later time, poses problems of intergenerational equity, as it “tends to increase the disposable income of the current generation while – *ceteris paribus*– reducing that of future generations” (Nautet and Van Meensel, 2011, p. 10). The concept of intergenerational neutrality has been thus introduced to point at the fact that the net contribution of each generation to the government should be similar. Ideally, public debt should be spent into public productive investment, which should stimulate growth so to enable income to raise and, *ceteris paribus*, fiscal revenues. In practice, this is rarely the case, as the reduction of debt is seldom entirely due to economic growth, but rather follows austerity policies and debt restructuring taking several years (Reinhart and Rogoff, 2011).

The negative implications of debt are that it promotes macroeconomic instability (Singh, 2006), increases long run interest rates and thus crowds out private investment; decreases future flows of income, and constrains the capability and credibility of government intervention in the economy and may lead to debt overhang. As public debt increases the demand for capital goods by the government, it increases interest rates, thus (indirectly) crowding out private investments. Whenever debt is then paid back by taxes, tax increase will diminish the incentives to generate income. In addition, also expectations of future increase in taxes may reduce

private capital formation. Large levels of public debt are namely often associated with the so called debt overhang (Krugman, 1988, Sachs, 1989), which is a situation in which private investment is discouraged, as “the private sector anticipates that the returns from their investments will be used to pay back creditors” (Presbitero, 2010, p.2). In other words, a “heavy debt burden may act as an implicit tax on the resources generated by a country, and therefore reduce the size of domestic and foreign investments as well as their quality, and create negative incentives for policy reforms” (Cordella et al., 2005, p.4).

Last but not least, highly indebted governments won't be able, even in times of economic difficulties, to credibly implement massive expenditures programs to stimulate the economy. As a general consideration, the adverse effects of public debt on growth will be mitigated whenever debt is used to finance “investment, expenditure on infrastructure, education, operation of public institutions, security and a reduction in taxation” (Nautet and Van Meensel, 2011). As a consequence of macroeconomic instability, public debt seems to promote capital flight and to enhance political volatility (Malone, 2010).

The growth implications of debt have been therefore widely analyzed from the analytical point of view. Most of the contributions consist of growth models with a public sector issuing debt to finance either consumption or the purchase of capital goods. Some early studies (e.g. Buchanan, 1958, Meade, 1958, and Modigliani, 1961) rely on neoclassical intergenerational growth models and assume that the government levies taxes to repay the debt and its interest payments. As a result, they corroborate the idea that debt is a burden for future generations as it reduces private capital formation and thus the future flow of income. In this perspective, the negative effects of national debt on growth can be disentangled into a direct crowding out of private investment due to the lower private capital formation

and into an indirect effect due to the long term increase of interest rates following the reduction of private capital and consequent increase of its marginal product (Modigliani, 1961). Modigliani further argues that the only theoretical setting in which the negative implications of debt for an economy may be offset is the case in which public debt strictly contributes to productive public capital formation.

These models evidence as channels through which public debt negatively affects growth the fiscal burden and the long term interest rate: first, public debt is associated with fiscal burden and thus diminishes the incentives of households to save and of firms and entrepreneurs to work and invest (Meade, 1958). A reduction of debt would reverse these effects in a non linear positive fashion as, on top on that, it may allow to decrease taxation at a later stage as due to the decrease in interest payments.

Second, public debt affects growth in that it causes an increase in the long term interest rate: long term debt is typically associated with increasing yields on sovereign debt. Private sector investors tend to be attracted by the public debt's higher remuneration, leading thus to a net flow of capital from the private to the public sector which implies a decrease in private spending and increase in private interest rates (Elmendorf and Mankiw, 1999).

Building on the neoclassical growth model by Modigliani (1961), but encompassing individual consumption choices, Diamond (1965) differentiates between internal and external debt and analytically shows that external debt reduces the utility level of individual tax payers in the economy and internal debt does the same to an even larger extend. Basically, both external and domestic debt require the same amount of taxes to be paid back, but in the case of domestic borrowing, the state enters on the demand side of the capital market, concurring thus, with the private investors. In addition, marginal productivity of capital

will increase, too, thus further crowding out private capital formation.

A later line of research aims at determining optimal levels of debt and thus conceptualizes the non-linear growth implications of public debt: the idea is that there is an inverted U shape relationship between public debt and GDP growth rate, meaning that for low level of public debt ratio to GDP there is a positive impact on economic growth and after a turning point debt negatively impacts growth. As public debt increases the income of the present generation and reduces that of future generations, an optimal level of public debt can be determined comparing the costs and returns on government intervention (Nautet and Van Meensel, 2011).

The rationale of considering non linearity for the growth implications of debt is to assume that government partially uses debt to finance productive public capital: in this way, low level of debt may stimulate economic growth (Abbas and Christensen, 2010), whereas high levels of public debt definitely reduce it, also as due to a larger impact of debt repayment and eventually debt overhang. Adam and Bevan (2005), focusing on public deficit, develop a similar non linear theoretical model and empirically validate its conclusions for a panel of 45 developing countries. According to their results, they fix the turning point at a threshold of public deficit being at around 1.5% of GDP.

Empirically, both the level of public debt per se and its changes have been shown to affect growth via some of its determinants such as private saving, public investment, total factor productivity, and sovereign long term interest rates. More specifically, there seems to be strong evidence for a non linear effect of debt on growth with a maximum for a threshold of 90% of GDP (Presbitero, 2010, Reinhart and Rogoff, 2010, and 2011). Different contributions point at the optimality of a threshold between 70 and 80% of GDP (Checherita and

Rother, 2010, Caner et al., 2010). Cordella et al. (2005) even corroborate the idea of two different thresholds determining the growth implication of sovereign debt: relying on a panel of about 80 developing countries, they find evidence that the debt overhang only holds for low level of public debt, whereas debt becomes irrelevant to growth for very high levels of it.¹

3. Literature Review on Domestic Versus External Debt

Since the early 2000s, the importance of domestic components of the sovereign debt has been increasingly highlighted: it is nevertheless still debated in the literature, whether this is due to an increase in the share of domestic to total debt without precedents or rather to the improvement of government statistics and availability of better data on domestic debt (Reinhart and Rogoff, 2008). In general, there is a substantial lack of systematic empirical investigations of the consequences of domestic debt. Reviewing the literature about this topic, four main reasons for that can be summarized: (1) the limited availability of high quality data, (2) a kind of lack of interest towards the growth implications of domestic sovereign debt, (3) some issues related to the operative definition of domestic debt, and (4) the mainstream economic policy advice favoring external borrowing.

First, it is not always straightforward to obtain reliable data on the domestic debt components of developing countries (Presbitero, 2010) and attempts to build comprehensive and reliable datasets for domestic debt are still relatively recent (for an overview, see Panizza, 2008, p. 2-3). As the International Monetary Fund points out, “the perception that domestic debt does not this topic, play an important role in low income countries, may have been partly the result of weak data availability” (IMF and World Bank, 2004, p. 31).

Second, the increasing relevance of domestic debt components over the last years is accompanied by a

growing attention towards this topic (“The changing context in LICs [Low Income Countries, ed.] suggests a need to strengthen the analysis of total public debt and fiscal vulnerabilities. Although external public debt remains the largest component of debt in most LICs, domestic debt is becoming more prominent” IMF and World Bank, 2012, p. 12), but still the topic is not really raising the interest it should by the academia. A possible reason may be “a wide-spread perception that DD [domestic debt] is ‘endogenous’ rather than an exogenous policy choice variable [and that, Ed.] countries’ DD issuance capacity is ‘determined’ entirely by their level of income, pool of savings and institutional quality” (Abbas and Christensen, 2010, p. 211).

Third, the analysis of domestic public debt is complicated by its operative definition. Debt components (external and internal) can be classified according to three dimensions: currency, residence of the creditor, and place of issuance / legislation regulating the debt contract (Panizza, 2007, and 2008). Even though the application of these criteria is quite straightforward for external debt components, it is not for the domestic ones: currency of issuance cannot be used as clear cut definition, as some countries may issue debt in foreign currency. Residence of creditor, which should be used according to the official definition of domestic debt by the “External Debt Statistics: A Guide for Compilers and Users” (IMF, 2003), similarly does not help much, as there are no limitations for treasury bonds’ ownership.

The definition which is more applicable is the one relying on the legislation regulating the debt contract (Cowan et al., 2006). A further issue that should be considered in evaluating the macroeconomic implications of domestic debt is how this debt is contracted: if domestic debt is financed by an increase in the money supply, it has no direct financial costs, but may have extremely high macroeconomic costs, such as inflation, pressure on the exchange rate and/ or on the balance of payment, and excessive overall demand. If it

is financed by the domestic banking system and / or by privates, domestic borrowing tends to increase interest rates and thus to crowd out private investment (Beugrand et al., 2002).

Forth, the “forgotten history” of domestic debt (Reinhardt and Rogoff, 2008) has also to do with the general plea for external debt: many analysts shared the view that, given the weak institutions of many developing countries, poor debt management was to be expected, yielding for adverse macroeconomic effects (Abbas and Christensen, 2010). Arguments supporting the prevalence of external forms of debt financing are that is typically cheaper for most of the developing countries, as it very often assumes the form of conditional loans and grants.

Further advantages of foreign borrowing are that it seems to be less related to inflation, to crowd out private investment at a lesser extent than domestic debt, and to promote financial discipline (Beugrand et al., 2002). At a closer look, however, the argument of the lower interest rate associated with foreign borrowing may be offset in case of flexible exchange rate and / or floating rates on borrowing. Also the argument of lesser crowding out fails, in case of sterilization of funds (Beugrand et al., 2002). Considering the frequency of sovereign default with external debt (Kohlscheen, 2009) and debt relief may also lead to question the financial discipline hypothesis.

A main concern associated with external borrowing is that it increases the vulnerability of an economy to external shocks. Changes in the exchange rate may lead to floating debt services and concerns about a country’s stability may affect the behavior of foreign borrowers (IMF, 2000). From the other hand, “domestic debt carries benefits (e.g., development of local financial markets, no exchange rate risk) but also costs (e.g., crowding out of private investment, incentives for financial repression)” (IMF, 2012, p.12) Among the positive effects of domestic debt are that it discourages

capital flight and it provides, in countries with external debt component, a diversification of risk (Abbas and Christensen, 2010). Domestic debt may help in strengthening a country's financial markets and institutions and serve as a sort of collateral for the domestic banking system, which may have more funds to support private investors (Kumhof and Tanner, 2005). This may enhance private capital formation and increase overall productivity.

The potential dangers of government domestic borrowing are essentially related to the repercussions on private sector lending and fiscal sustainability. The main idea is hereby that domestic public borrowing uses up domestic private savings that are then no longer available for private sector lending (Abbas and Christensen, 2010). In other words, the government concurs with the privates on the credit markets (Diamond, 1965), which are typically constrained on most of the developing countries. This may lead to credit rationing and add to the increase of the long term interest rate in crowding out private investments (Presbitero, 2010). Furthermore, domestic debt is more costly and has higher services: even under market conditions, i.e. in case of non concessional external government financing, there is always a risk premium on government securities to attract capital. The higher interest on domestic debt triggers an increase of long term interest rates and inflation. In many low income and developing countries domestic debt has a rather short term structure (Christensen, 2004) and this may cause liquidity concerns and further add to the threat of inflation.

As said, the empirical evidence on the macroeconomic implications of domestic debt is still unsystematic. Some of the most significant exceptions in this sense are discussed as follows.

Singh (1999) investigates cointegration and Granger causality in case of domestic debt and economic growth in India for comparing the hypothesis of a negative growth effect of domestic debt to the Ricardian

hypothesis of neutrality of domestic debt to economic growth. His results point at no cointegration between domestic debt and growth, but support the neutrality hypothesis.

Relying on a sample of 39 countries, Abbas and Christensen (2010) study the Granger causality between domestic debt and GDP. Their results show that even though moderate levels of domestic debt enhance growth, levels exceeding 35% of GDP will negatively affect it.

Focusing on the case of Kenya from 1996 to 2007, Maana (2008) explicitly investigates the crowding out effect of domestic debt on private sector lending: the results do not find evidence for significant crowding out, but rather support the hypothesis that domestic debt positively affects economic growth.

Muhdi and Sasaki (2009) examine the macroeconomic effects of external and domestic debt in Indonesia from 1991 to 2006: using OLS estimation they show the positive impact of external debt on investment and economic growth, as well as a significant crowding out of domestic debt on investment, due to the reduction of capital stock and total production.

Atique and Kamran (2012) compare the growth implications of domestic and external debt for Pakistan over the period of 1980-2010. They find that both domestic and external debt are significantly inversely related to GDP growth. Relying on growth models contrasting the effects of external and domestic debt with further independent variables being investment, human capital, inflation, and corruption, their analysis ascribes larger effects to external debt.

4. Public Debt in Jordan

Jordan is a small resource poor country of the Middle East and, as such, it has a long history of chronic budget deficit and high government debt. Since its constitution, the Jordanian state has been heavily dependent on external financial resources and support, which have

been taking the form of official development assistance, grants, conditional and non-conditional loans (Knowles, 2005, Alshyab, 2011)

Since the economic and financial crisis of 1989, public debt has become a very important issue for the Jordanian government: in 1989, the debt jumped to 225.1% of GDP and, with debt services reaching in 1988 a debt service ratio of 37.9 % (Central Bank of Jordan, 1991), Jordan was risking to become a debt trap victim (IEO, 2005; Schlumberger, 2000). This, added to the drastic devaluation of the Jordanian Dinar, the large deficit in the balance of payments, and the exhaustion of external reserves, may shed some light on the difficult circumstances inducing Jordan to engage, under the umbrella of the International Monetary Fund and World Bank, in a comprehensive economic reforms program.

Since then, Jordan has achieved significant steps towards its macroeconomic stabilization: Jordan has been also supported by debt-rescheduling arrangements which were agreed with the creditor nations in concomitance with the renewal of each of the IMF support programs.² After 1994, debt write-offs and swaps gained importance, too. In 1998, total debt was reduced to 110% of GDP and in 2001 a new public debt management law was approved, with which Jordan has committed to total debt not exceeding 80% of nominal GDP, with neither its domestic nor its external component being larger than 60% of output (Public Debt Management Law, Law Nr. 26, for the Year 2001). From 2006 to 2011, the country managed to keep total sovereign debt under the 80% threshold (cf. Figure 1).

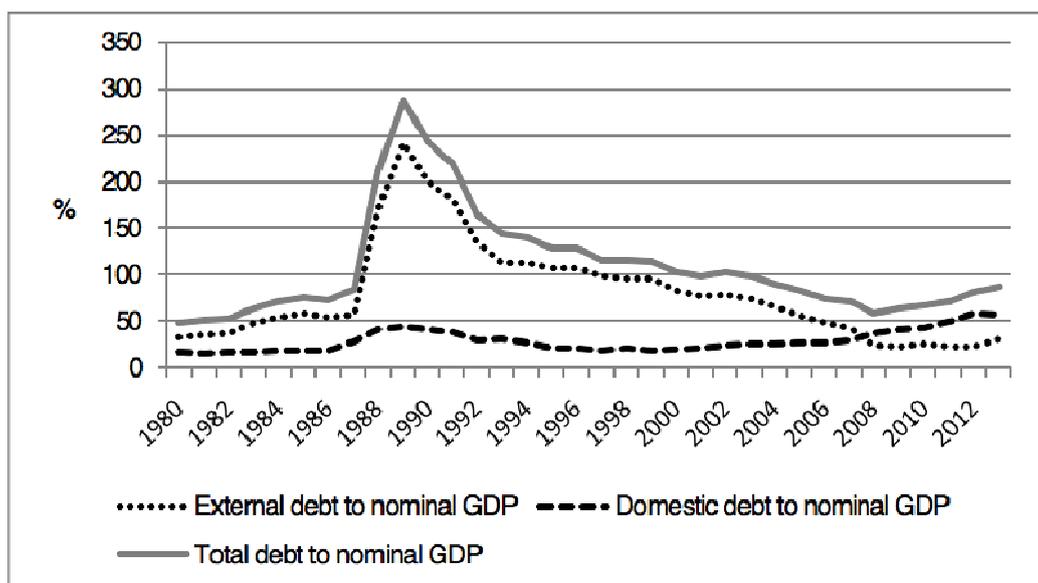


Figure 1: Public debt in Jordan as share of GDP (Data source: Central Bank of Jordan)

According to the Central Bank of Jordan, public debt increased by the end of 2013 to JD billion 20.67 which equates to 87.56% of nominal GDP. This marked an increase of more than 6% in GDP share from the previous year. The increase can be mainly ascribed to the high budget deficit due to the disruption of gas

imports from Egypt, causing the National Electric Power Company to expect cumulative losses of JD billion 3.5 by the end of 2013.³

As shown by Fig. 1, until 2008 external debt represented for Jordan the largest debt component. Notwithstanding, domestic debt has represented a

significant portion of the debt (the average share of domestic debt to nominal GDP from 1980 to 2007 was 25%), whose importance has been increasing over time. Since 2008, the GDP share of domestic debt components has become even higher than the share of external debt. In 2013, domestic debt represented, with JD billion 13.44, 56.9% of GDP and external (with JD billion 7.23) 30.6%. Most of the domestic public debt consists of public borrowing from the private banking sector: in 2013, claims on the public sector by licensed domestic banks were JD million 10,458.8,⁴ corresponding thus to 78% of domestic debt for the same year.

Among the most urgent challenges that the country faces at present there are the massive inflow of refugees (the United Nations Refugee Agency (UNHCR) has currently registered the presence of 624,513 refugees from Syria)⁵ and the high inflation with a peak of almost 19% in 2008 and a rate of 6.2% on average between 2010 and 2013.⁶ Further, according to data from the Jordan Department of Statistics, by the fourth quarter of 2014, total unemployment rate was 12.3%, male unemployment rate was 10.9% and female unemployment rate while it was 19.1%.

5. Empirical Analysis

As follows, the empirical analysis is introduced, together with the main hypotheses that will be tested.

5.1 Model Specification and Research Hypotheses

The empirical analysis is based on a neoclassical growth model, relying on a Cobb Douglas functional specification, with capital (K), labor (L), and public debt (PD) as independent factors of production. The dependent variable Y is real GDP and the index t indicates the year of reference.

Specifically, the growth model has the following functional form:

$$Y_t = \alpha K_t^{\beta_1} L_t^{\beta_2} PD_t^{\beta_3}$$

This growth model is analyzed with three different

specifications for the variable public debt, namely, total public debt (TD), domestic public debt (DD), and external public debt (ED). The aim is herewith an empirical comparison of the growth effects of public debt and of its domestic and external components.

The model is estimated relying on a Johansen cointegration test (Johansen, 1988) for the logarithmic variables. In particular, the following functional specifications have been tested:

$$\text{Model specification 1: } y_t = a + \beta_1 k_t + \beta_2 w_t + \beta_3 td_t$$

$$\text{Model specification 2: } y_t = a + \beta_1 k_t + \beta_2 w_t + \beta_3 ed_t$$

$$\text{Model specification 3: } y_t = a + \beta_1 k_t + \beta_2 w_t + \beta_3 dd_t$$

Where all lowercase variables are the natural logarithm of the corresponding uppercase variables and specifically:

y_t natural logarithm of real gross domestic product

k_t natural logarithm of real capital accumulation (as a proxy for capital)

w_t natural logarithm of compensation of employees in real terms (as a proxy for labor)

td_t natural logarithm of total outstanding public debt in real terms

ed_t natural logarithm of outstanding external public debt in real terms

dd_t natural logarithm of outstanding domestic public debt in real terms

In general, we expect public debt to have negative and significant impact on the economic growth of Jordan: the first three hypotheses translate thus in the estimation of negative coefficients for total, external, and domestic debt. As a further research hypothesis, we expect domestic debt to have a larger negative effect on growth than external debt. This hypothesis is motivated by the idea that domestic debt may be associated to crowding out of private domestic investment and lead to credit rationing. We support this hypothesis with the fact that a large share of domestic debt is actually

represented by loans provided to the state by the private banking system.

As related econometric analysis, the study by Umaru et al. (2013) focuses on the case of Nigeria and estimates a Cobb Douglas function specified with only external and domestic debt as factors of production substituting capital and labor. We believe, our model improves and add the analysis by Umaru and coauthors, as it considers public debt as one of the possible determinants of growth. Thus, we expect highly significant results.

As discussed above, competing model's specifications for domestic and external public debt are investigated for the case of Pakistan by Atique and Kamran (2012), who add to capital and labor the control variables corruption, and inflation. In the present paper, we control for the effect of inflation, considering all variables, even public debt and components, in real terms.

At best of our knowledge, econometric evidence on the growth implications of domestic debt for Jordan is still lacking: this study contributes to disentangling the growth implications of total, domestic, and external public debt on the Jordanian economy referring to the period from 1980 to 2013 and comparing competing specifications of a growth model.

5.2 Data Set

The empirical analysis is based on annual data referred to the period 1980-2013, yielding thus for 34 data entries per variable considered. If not differently specified as follows, all annual data series have been published by the Central Bank of Jordan in the 50th special issue of the Yearly Statistical Series edited in 2015 and in different annual issues.

In particular, the following variables have been considered in real terms, indexed at 1994-GDP deflator: the dependent variable is Real Gross Domestic Product, expressed in JD millions. As independent variable, real compensation of employees has been considered as a

proxy for labor.⁷ Further independent variable is, as proxy for capital, capital accumulation. Capital accumulation has been calculated relying on the incremental capital-output ratio (ICOR) approach (Hammad, 1986). The incremental ratio of capital to output is the ratio of sum of real net capital formation for the whole period by the range of real gross domestic product. The ICOR for Jordan from 1980 to 2013 is 4.28. As a next step, the ICOR is multiplied by the real GDP of beginning of the considered period (i.e. 1980), to obtain the estimated capital formation for the first year. Then, by cumulating the net real capital formation, capital accumulation for the whole period is estimated.⁸

Further independent variable to be considered in the competing model specifications are total, external, and domestic public debt. As for the other data series, data for public debt stem from the Central Bank of Jordan. Also these variables have been considered in real terms, based on the GDP deflator indexed to the year 1994.

5.3 Data Analysis and Empirical Findings

This section presents the empirical results of the study including unit root test for stationarity of variables and Johansen cointegration test to investigate the long run relationship between the variables in the three model specifications. Further steps of the econometric analysis were the estimation of a Vector Error Correction Model, to analyze the dynamics of the three model specifications, Granger causality to investigate eventual uni-and bi-directional causality between variables, and a stability test for the data to check for structural changes. All tests have been performed using the software EViews 8.

As preliminary step of analysis, a unit root test was run on each of the time series. This has two main reasons: first, if time series are non stationary, regression results would be spurious. Second, the order of stationarity is an important assumption of the different econometric models and its determination is therefore

crucial for the choice of an appropriate econometric technique. Specifically, stationarity and its level have been determined adopting an Augmented Dickey-Fuller (ADF) test and the lag was specified according to the Akaike information criterion (AIC). A unit root test for each variable was performed on both the level and on the

first difference. The test equation for the ADF was determined based on the graph of each variable. We found that none of the variables were stationary at the level, but all of them become stationary at the first difference (see Table 1).

Table 1
Augmented Dickey-Fuller (ADF) Unit Root test

Variables	Level I (0)				First level I (1)			
	t-statistics	Critical value	Lag	Included in test equation	t-statistics	Critical value	Lag	Included in test equation
dd_t	-0.74	-3.55	0	Constant and trend	-2.58	-1.95*	1	None
ed_t	-2.21	-3.55	1	Constant and trend	-4.48	-1.95*	0	None
td_t	-2.51	-3.55	1	Constant and trend	-2.55	-1.95*	3	None
y_t	-1.61	-3.57	3	Constant and trend	-3.29	-3.22**	2	Constant and trend
k_t	-2.63	-3.57	3	Constant and trend	-5.17	-3.57*	3	Constant and trend
w_t	-2.44	-3.56	2	Constant and trend	-4.01	-1.95*	0	None

- lowercase variables indicate the natural logarithm of the corresponding uppercase variable.

- the null hypothesis of non stationarity cannot be rejected whenever the t-statistics is larger than the critical value.

- the test equation for the ADF was determined based on the graph of each variable.

*Significant at 5% level.

**Significant at 10% level.

Because all of the series are stationary at the first difference, we adopt the Johansen cointegration test (Johansen, 1988) to determine whether there is cointegration between the variables and to test the long run relationship between them. The results of trace and maximum eigenvalue test indicate that there are cointegration vectors among the considered variables for each of the three model specifications at a 5% significance level.

The results of the three model specifications are summarized by long run estimated normalized

cointegrating coefficients as in Table 2. The table presents the estimated coefficients after correction of the sign.

The results show a negative effect of total public debt on GDP. In particular, an increase in total public debt by one percent decreases output by 0.18 percent. This result is significant at a 5% level. The data further corroborate the idea of both external and domestic debt having negative implications for economic growth: with a significance of 5%, a one percent increase in external debt causes GDP to decrease by almost 0.078 percent,

whereas an increase in domestic debt implies by one percent, at a level of significance of 5%, causes a decrease in output by 0.072 percent. In other words, even though both the effects of domestic and external debt on growth are of comparable magnitude, an

increase in domestic debt seems to have slightly less negative effects on growth. Furthermore and as expected, the results for the three model specifications reveal a positive effect of labor and capital on GDP at a 5% significance level.

Table 2
Results of Johansen cointegration analysis for the linear model specifications

Model 1	$y_t =$	$+ 0.522 k_t$	$+ 0.649 w_t$	$- 0.1823 td_t$	
<i>SE</i>		<i>(0.2033)</i>	<i>(0.1464)</i>	<i>(0.0041)</i>	
<i>t-stat</i>		<i>(2.571)</i>	<i>(4.445)</i>	<i>(4.341)</i>	
Model 2	$y_t =$	$+ 0.343 k_t$	$+ 0.700 w_t$	$- 0.0778 ed_t$	$+0.365$
<i>SE</i>		<i>(0.0990)</i>	<i>(0.0822)</i>	<i>(0.0156)</i>	<i>(0.318)</i>
<i>t-stat</i>		<i>(3.462)</i>	<i>(8.522)</i>	<i>(4.987)</i>	<i>(1.147)</i>
Model 3	$y_t =$	$+ 0.2721 k_t$	$+ 0.8086 w_t$	$- 0.0726 dd_t$	
<i>SE</i>		<i>(0.0772)</i>	<i>(0.1231)</i>	<i>(0.0417)</i>	
<i>t-stat</i>		<i>(3.525)</i>	<i>(6.568)</i>	<i>(1.739)</i>	

Therefore, the findings support the first three research hypotheses (negative growth implications for total, external, and domestic public debt), but do not provide support for domestic public debt having more adverse growth effect than external debt. A possible reason for that can be found in the fact that the Jordanian banking system is characterized by high liquidity and has experiencing a sustained growth of deposits and of credit facilities: according to yearly data provided by the Central Bank of Jordan,⁹ from 2003 to 2013 deposits have grown at an average rate of 10.4% and credit facilities at a rate of 13.4%. In 2013, deposits were JD million 27,593.2 and corresponded thus to 116% of nominal GDP. In the same year, credit facilities were JD million 18,939.7, i.e. 79.4% of nominal GDP. These facts may explain why domestic public borrowing does not imply credit rationing for the Jordanian economy.

Having found cointegration between the variables in the data set, a Vector Error Correction Model (VECM) has been estimated to point at the rate (speed) of adjustment of the dependent variable to changes in the independent variables, thus to the convergence to long run equilibrium. VECM estimation starts with an over-parameterized model, in which all variables are lagged to two periods, and iteratively eliminates the non significant parameters in order to obtain a more refined and parsimonious model (for more on VECM, see Greene, 2000).

The results for VECM estimation for the three model specifications are presented in Appendix A. The determination of the number of lags to be performed for the VECM emerges from a Lag Length Criteria Test.

The results from the VECM support the existence of a long run relationship between the variables considered:

the Error Correction Term (ECT) is, as expected, negative for all three model specifications. In model 1, ECT is -0.045, meaning that the rate of adjustment of the dependent variable to the long run equilibrium is significant at 5% level and equals 4.5%. The coefficient for the first period lag of total public debt is significant and equals almost -13%. This implies that a 1% increase in total public debt will lead, in the short run, to a contraction in GDP by 0.13% in the successive year.

For model 2, ECT is, as expected, negative, and equals -1.51, but is not significant. Model specification 3 presents a ECT which is significant at 10% level and equals -0.36, meaning that the speed of adjustment to long run equilibrium is 36% when any past deviation will be corrected in the present period. The coefficient for the first lag of domestic public debt is significant at 5% and equals -0.227, indicating thus that a 1% increase in domestic public debt implies in the short term an adjustment in GDP by 0.22%.

In order to check for the causality between variables and its direction, a Granger causality test has been run. In general, Granger causality test infers causality whenever lagged variables have a certain explanatory power on the dependent variable of a regression (Greene, 2000). The results of the Granger causality test for the considered variables are in appendix B. The results show that there is a significant bi-directional causality between GDP and total public debt, as well as between GDP and domestic public debt, whereas external public debt uni-directionally Granger cause GDP.

A test of stability of parameters has been run in the form of a cumulative sum of recursive residuals (CUSUM) to investigate the stability of residuals. As appendix C shows, residuals are stable and lie within the 5% interval of significance, so that the whole period considered for analysis can be treated as one single interval, without the need to consider sub-intervals.

6. Conclusion and Policy Recommendations

Budget deficit, public debt, and government borrowing are serious concerns for many countries and also for Jordan. Until the beginning of the 2000s, Jordan used to finance external deficit mainly through external sources. Since then, Jordan has progressively increased the share of domestically financed deficit and starting by 2008, domestic borrowing has become the largest source of debt financing. This shift in debt management makes of Jordan an excellent case of study for testing the macroeconomic implications of different sources of government borrowing.

Relying on Johansen cointegration test and Vector Error Correction Model, the present study disentangles the growth contribution of total, external, and domestic public debt for Jordan from 1980 to 2013. In a theoretical perspective, the growth implications of sovereign debt do not always show the same direction, but may depend on the utilization of debt: public debt may yield for growth stimulating effects if associated to public investment into capital goods, or rather with growth hampering effects if used to cover running costs of the state. A further way of looking at contrasting effects of public debt on growth relies on assuming non linearity and thus looking at the existence of an optimal level of debt.

This study contributes to the existing literature on public debt, comparing the growth effects of external and domestic debt components. In general, from the one hand, external debt may be associated, for developing countries, with lower costs, but it may increase the vulnerability of a country to external shocks and reduce its foreign reserves. From the other hand, domestic debt may stimulate the development of the domestic financial markets, but may crowd out domestic private investment and lead to credit rationing. Thus, conclusions on the macroeconomic implications of the different forms of public borrowing should be empirically analyzed taking the different countries' realities into consideration.

Overall, as assumed, the results of the present econometric analysis corroborate the idea that, for the case of Jordan, the negative implications of public debt prevail. As the data suggest, external and domestic public borrowing yields for pretty similar implications. This seems to offer support to the strategy of diversification of the sources of debt financing, as it has been actively pursued by Jordan at least since the beginning of the 2000s and the progressive reduction of external in favor of domestic debt components.

The analysis provides support for some general

considerations about public debt management, which are valid for Jordan, but may hold for developing countries facing similar situations. First, public debt seems to be a factor hampering economic growth, so that the consolidation of public finances and reduction of overall level of public debt should be a priority. Second, the study does not corroborate relevant differences in the growth effects of domestic and external public debt. Thus, a wise strategy for many developing countries may consist into a balanced mix between domestic and external shares of public debt.

Appendixes

Appendix A

Results for Error Correction Model for the dependent variable $D \log (Y)$

	Model 1	
Variable	<i>Coefficient</i>	<i>(t-stat)</i>
D log (Y_{t-1})	-0.078	0.269
D log (K_{t-1})	1.221	1.368
D log (W_{t-1})	-0.176	-0.995
D log (TD_{t-1})	-0.128**	-3.576
ECT	-0.045**	-2.544
R-squared	0.617	
Adj. R-sq	0.425	
**significant at 5% level (CV= ± 2.08)		
*significant at 10% level (CV= ± 1.72)		

	Model 2	
Variable	<i>Coefficient</i>	<i>(t-stat)</i>
D log (Y_{t-1})	0.576	1.500
D log (Y_{t-2})	0.552*	1.877
D log (K_{t-1})	0.148	0.11
D log (W_{t-1})	-0.714**	-2.433

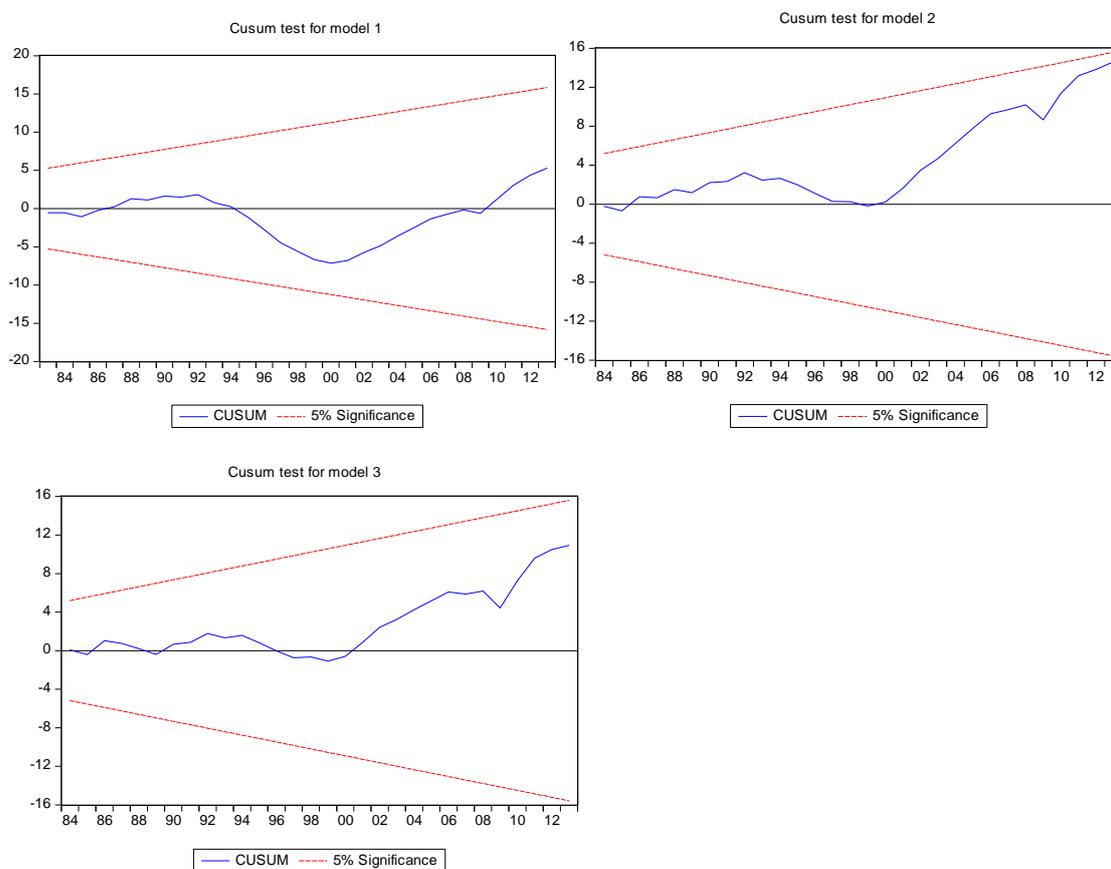
D log (W_{t-3})	-0.440**	-2.248
D log (ED_{t-1})	-0.182**	-4.191
ECT	-0.209	-1.510
R-squared	0.875	
Adj. R-sq	0.722	
**significant at 5% level (CV= ± 2.13)		
*significant at 10% level (CV= ± 1.75)		

	Model 3	
Variable	<i>Coefficient</i>	<i>(t-stat)</i>
D log (Y_{t-1})	0.754*	2.229
D log (Y_{t-2})	0.879**	2.405
D log (K_{t-1})	-0.241	-0.217
D log (W_{t-1})	-0.540**	-2.121
D log (DD_{t-1})	-0.227**	-2.375
D log (DD_{t-2})	-0.182*	-1.920
ECT	-0.365*	-1.970
R-squared	0.272	
Adj. R-sq	0.076	
**significant at 5% level (CV= ± 2.07)		
*significant at 10% level (CV= ± 1.71)		

Appendix B
Results of Granger causality test

Dependent Variable	Testing Hypothesis	Probability of F-stat.
D (log (Y))	TD does not Granger cause Y	0.002
D (log (TD))	Y does not Granger cause TD	0.076
D (log (Y))	ED does not Granger cause Y	0.000
D (log (ED))	Y does not Granger cause ED	0.273
D (log (Y))	DD does not Granger cause Y	0.032
D (log (DD))	Y does not Granger cause DD	0.000

Appendix C Results of CUSUM stability test



Notes

- (1) Expected sovereign default of highly indebted countries leads to debt forgiveness: whenever individuals expect debt forgiveness, public debt cannot bias the incentives for productive activities and investment.
- (2) Specifically, debt-rescheduling with the Paris Club occurred in 1989, 1992, 1994, and 1997, and with the London club in 1993.
- (3) Estimated from the “National Strategic Plan for Dealing with NEPCO’s Losses” elaborated by the Ministry of Energy and Mineral Resources of Jordan.
- (4) Data from the 5th issue of Central Bank of Jordan, table 7.
- (5) Stand of March 2015 as of <http://data.unhcr.org/syrianrefugees/country.php?id=107>
- (6) Authors’ calculations based on GDP deflator data by the Central Bank of Jordan.
- (7) Data entries for compensation of employees for 2010 and 2011 have been taken from the Yearly Statistical Book of the Jordan Department of Statistics (DoS). As due to non availability of data entries for compensation of employees for 2012 and 2013, their values have been estimated relying on the average growth rate over the last three years.
- (8) Data entries for gross capital formation and depreciation (i.e. consumption of fixed capital) for

2010 and 2011 have been taken from the Yearly Statistical Book of the Jordan Department of Statistics (DoS). As due to non availability of data entries for the 2012 and 2013, the values of gross capital formation have been estimated based on their

average ratio to nominal GDP over the last three years. Depreciation for the same years was similarly calculated relying on the ratio of depreciation to gross capital formation for the last three years.

(9) Cf. Central Bank of Jordan, 5th issue, table 7.

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الدين الداخلي والخارجي في الأردن: دراسة تحليلية

نوح الشيباب¹

ملخص

تهدف هذه الدراسة إلى اختبار تأثير الدين العام بشقيه الداخلي والخارجي على الاقتصاد الأردني. اعتمد التحليل القياسي على النموذج الكلاسيكي الجديد باستخدام معادلة كوب دوغلاس، التي تعتمد على رأس المال والعمالة بالإضافة إلى الدين العام كمتغيرات مستقلة، وتم تقدير النموذج بثلاثة أشكال مختلفة، الأول باستخدام الدين العام والثاني باستخدام الدين العام الخارجي والأخير باستخدام الدين العام الداخلي، وتم تطبيق طريقة جوهانسن للتكامل المشترك واختبار تصحيح الخطأ، لاختبار العلاقة طويلة الأجل بين المتغيرات خلال فترة الدراسة (1980-2013). أظهرت النتائج وجود تأثير سلبي للدين العام على النمو الاقتصادي، وإلى تماثل الأثر السلبي للدين العام الخارجي والدين العام الداخلي على الاقتصاد.

الكلمات الدالة: الدين العام، الدين العام الخارجي، الدين العام الداخلي، النمو الاقتصادي، الأردن.

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