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"Twin Deficits and the Sustainability of Macroeconomic Policies in Selected European and Mediterranean Partner Countries: Post Financial and Debt Crises"

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Twin Deficits and the Sustainability of Macroeconomic Policies in Selected European and Mediterranean Partner Countries: Post Financial and Debt Crises*

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EXECUTIVE SUMMARY

In the wake of the recent European Union (EU) debt crises, the 2008 United States (US) financial crisis and the worldwide triple dip recession of the past nine years, the solvency of some EU and Mediterranean (MED) countries has become a major source of concern for policy makers. Greece, Portugal, Ireland, Italy, and Spain have been running budget deficits for the past two decades averaging between 5 and 10 percent of Gross Domestic Product (GDP), resulting in a EU's public debt averaging above 120 percent of total GDP in 2016. The picture is quite similar in the MED region where social, political and military tensions have aggravated even further an already deteriorating macroeconomic environment.

As a result, policy makers have introduced various austerity measures in order to curb and limit further deteriorations in the EU and MED fiscal and macroeconomic positions, despite genuine fear that these measures could collapse aggregate demand, worsen the already high unemployment rates, and further lower prices. If domestic prices decline through aggressive wage and income cuts as dictated by the various austerity programs, the respective real exchange rate will depreciate so as to make domestic goods more competitive internationally. While this policy may improve the current account deficits of Greece, Portugal, Ireland, Spain and Italy, and that of the Mediterranean Partners (MPs), it is expected to lead to painful domestic adjustment measures, as a significant number of domestic firms will likely shut down, worsening further the EU and MPs unemployment rates.

Turning to the macroeconomic literature, studies analyzing current account and budget deficits and public sector's fiscal and financial vulnerabilities have considered closely the issues of debt sustainability and the Twin Deficit Hypothesis. Fiscal sustainability can be determined in various ways, and the literature is rich in studies trying to assess the financial vulnerability of the public sector. This research project makes use of the Present Value Constraint (PVC) framework and the twin deficit hypothesis to look at the issue of fiscal and macroeconomic sustainability in the EU's countries of Greece, Ireland, Italy, Portugal and Spain and a subset of MPs (Egypt, Jordan, Morocco, Tunisia, and Lebanon).

Our empirical results validate the Twin Deficit hypothesis in both EU and MED samples, but with diverging findings regarding the direction of causality. While the trade balance seems to be driving the budget deficit in MED countries –thereby validating the current account targeting approach - the relationship appears to run in the opposite direction in the case of EU countries, where the budget balance appears to be driving the current account. Given the well-documented dependence of MED countries on trade with the EU and the fact that most EU countries have implemented austerity policies in the aftermath of the financial crisis – thereby restricting aggregate demand and imports - we argue that the ensuing drop in export income for MED countries has contributed to increasing the budget deficit in these countries, by virtue of the uncovered positive causality between the current account and the budget balance. One natural MED policy makers' response would be to implement austerity measures; however, such measures which may be necessary, are socially costly in the current social context in MED countries, and would not alone permit to stabilize the budget balance given that they would leave the trade balance unaffected. Our findings thus represent a warning against such 'ready-made' macroeconomic policy responses and indicate that austerity policy in EU countries have unexpected consequences for fiscal stability in MED countries. We thus call for better macroeconomic policy coordination between the EU and its Southern peripheral MED countries.

Other empirical results have indicated that MED exports, imports, government revenues, government expenditures, current accounts, budget balances, public and foreign debts are all non-stationary series pointing to the non-sustainability of fiscal and macroeconomic policies in all five countries under investigation. Cointegration results also

point to the non-existence of a long-run relationship between government revenues and expenditures, exports and imports, and exports and foreign debt. The same is true for the EU countries where exports, imports, government revenues and expenditures, current accounts, budget balances, and total public debt were all non-stationary series pointing also to the non-sustainability of fiscal and macroeconomic policies in all five EU countries under investigation. However, and for the EU panel, the results point to the existence of a long-run relationship between government expenditures and revenues. It is, therefore, clear that at least and over the period under consideration the EU countries under investigation have tried to keep fiscal policies, especially taxation policies as well as fiscal spending under control.

A major policy issue to be faced in the coming years is whether macroeconomic policies have reached a dead end and are in a bind. With respect to the introduction of macroeconomic stabilization programs in the EU and MED countries, there is obviously no room to use both monetary and fiscal policies in tandem to curb those macroeconomic imbalances. For the MED countries of Lebanon and Jordan with very limited fiscal space and fixed exchange rates and open capital accounts, monetary policy is already ineffective in terms of macroeconomic stabilization. Egypt rendered its monetary policy more effective in dealing with external shocks after the recent smart move to a flexible exchange rate regime. Tunisia and Morocco seem to be also moving in that same direction. While fiscal space in the EU is also limited due to the past accumulation of huge public debts, the European Central Bank's (ECB) Quantitative Easing (QE) policy remains an effective tool in preventing the EU's unsustainable fiscal policies form developing into further debt crises similar to the Greek debt crisis.

With the current debt crisis unfolding in some EU countries, low GDP growth rates and oil prices and high debt levels in several MED countries, fiscal policy is clearly not a macroeconomic policy option anymore due to limited fiscal space. With one monetary policy conducted by the ECB and the absence of a political union, EU countries have registered over the past decade significant current account and budget deficits. Monetary Policy will remain ineffective as long as expectations of the private sector are not adjusted positively, and banks remain in poor shape, mainly Italian and Greek banks. The Greek Debt crisis is negatively affecting the behavior and expectations of businesses and consumers, and austerity measures are negatively affecting aggregate demand and the growth rate of GDP. In particular, stagnant wages and high unemployment rates are adversely affecting domestic demand, especially in the absence of fiscal space in most MED and EU countries due to the accumulation of large public debts and recurrent budget and current account deficits.

In the MED region, the ineffectiveness of monetary policy is due to the presence of fixed exchange rates and free capital movements. This boils down to no role for government policies (fiscal and monetary) to deal with the current macroeconomic imbalances paving the way for future fiscal and currency crises. Thus, the various EU and MED governments will need to: (1) reduce the public sector in favor of the private sector; (2) channel liquidity to the private sector through loans and encourage investments in productive ventures; and (3) reduce government spending and increase only supply side taxes. Finally, given the ineffectiveness of both monetary and fiscal policies, the private sector needs to take a leading role in addressing macroeconomic imbalances by first improving its expectations in both the EU and MED. This would increase the growth rate of GDP and would render debt more sustainable. Once the above is achieved, introduce austerity and structural adjustment measures. This will insure sustainable economic growth and will reduce the likelihood of a future debt and currency crisis.

Déficits Jumeaux et Viabilité des Politiques Macroéconomiques Dans Une Sélection de Pays Européens et Méditerranéens Partenaires : Post Crises Financières et Crises de la Dette

Sommaire

Dans le sillage des récentes crises de la dette de la zone euro (UE), de la crise financière de 2008 aux Etats Unis (US) et de la récession mondiale en triple creux de ces neuf dernières années, la solvabilité de certains pays de la zone euro (UE) et méditerranéens (MED) est devenue une préoccupation majeure pour les responsables politiques. Ces vingt dernières années, la Grèce, le Portugal, l'Irlande, l'Italie et l'Espagne ont accumulé des déficits budgétaires de 5 à 10 % du Produit Intérieur Brut (PIB) en moyenne, se traduisant par une dette publique dépassant en moyenne 120 pourcent du PIB total en 2016. La situation est quasi similaire dans la région MED ou les tensions sociales, politiques et militaires ont aggravé encore davantage un environnement macroéconomique déjà dégradé.

En conséquence, les décideurs politiques ont introduit diverses mesures d'austérité pour juguler et prévenir de nouvelles détériorations de la situation fiscale et macroéconomique dans la zone euro (UE) et en méditerranée (MED), malgré une crainte légitime que ces mesures provoquent l'effondrement de la demande globale, aggravent les taux de chômage déjà élevés et renforcent de la baisse des prix. Si les prix sur le marché intérieur baissent suite à des coupes agressives sur les salaires et les revenus dictés par ces divers programmes d'austérité, s'en suit une dépréciation du taux de change réel qui rendra les biens domestiques plus compétitifs à l'international. Bien que cette politique soit susceptible d'améliorer les déficits des comptes courants des gouvernements grec, portugais, irlandais, espagnol et italien, et ceux des partenaires méditerranéens (PM), elle devrait également engendrer des processus d'ajustement nationaux douloureux, puisqu'un un nombre important d'entreprises nationales vont probablement fermées entraînant une nouvelle dégradation sur le front du chômage dans les pays de la zone euro comme dans les PM.

Concernant la littérature macroéconomique, les études sur le déficit budgétaire, le compte courant et les faiblesses du système fiscal et financier du secteur public ont considéré avec attention les problématiques de viabilité de la dette et de l'hypothèse des déficits jumeaux. La viabilité fiscale peut être déterminée de plusieurs façons, et la littérature sur l'évaluation de la vulnérabilité financière du secteur public est abondante. Ces recherches utilisent comme cadre d'analyse la contrainte de la valeur présente et l'hypothèse des déficits jumeaux pour étudier la stabilité macroéconomique et la viabilité fiscale en Grèce, au Portugal, en Irlande, en Italie et en l'Espagne et pour une partie des pays méditerranéens (Egypte, Jordanie, Maroc, Tunisie, Liban).

Nos résultats empiriques valident l'hypothèse des déficits jumeaux pour les deux échantillons de pays UE et MED, avec toutefois des résultats contrastés concernant la direction du lien de causalité. Alors que la balance commerciale semble contribuer au déficit budgétaire dans les pays MED, validant ainsi l'approche de ciblage de compte courant, la relation apparait comme étant inversée pour les pays de l'UE, où le solde budgétaire semble influencer le compte courant. Compte tenu de la dépendance avérée des pays MED au commerce avec l'UE et du fait que la plupart des pays de l'UE ont mis en œuvre des politiques d'austérité suite aux crises financières (restreignant ainsi la demande globale et les importations), nous considérons que la baisse des recettes d'exportation qui en a découlée dans les pays MED a contribué à l'augmentation du déficit budgétaire de ces pays, en vertu du lien de causalité positif entre le compte courant et le solde budgétaire. Une réponse naturelle des responsables politiques dans les pays MED serait de mettre en œuvre des politiques d'austérité, et bien que de telles politiques puissent être nécessaires, elles n'en

restent pas moins socialement couteuses dans le contexte social actuel des pays MED, et ne permettraient pas pour autant de stabiliser la balance budgétaire, puisqu'elles n'affecteraient pas la balance commerciale. Par conséquent, nos résultats sont une alerte à de telles politiques macroéconomiques « toutes faites », et indiquent clairement que les politiques d'austérité dans les pays de l'UE ont des conséquences inattendues sur la stabilité financière des pays MED. Nous appelons donc à une meilleure coordination des politiques macroéconomiques entre l'UE et ces partenaires du Sud de la méditerranée.

Nos autres résultats empiriques indiquent que les exportations, les importations, les recettes et les dépenses gouvernementales, les comptes courants, les soldes budgétaires, les dettes publiques et extérieures sont toutes des séries non stationnaires révélant la non viabilité des politiques fiscales et macroéconomiques pour les cinq pays étudiés. Les résultats des tests de cointégration ont également révélé une relation de long terme entre les recettes et les dépenses du gouvernement, les exportations et les importations, les exportations et la dette extérieure. Il en est de même pour les pays de l'UE où les exportations, les importations, les revenues et les dépenses du gouvernement, les comptes courants, les soldes budgétaires et la dette publique totale sont toutes des séries non stationnaires, et témoignent à nouveau de la non viabilité des politiques fiscales et macroéconomiques pour les cinq pays européens étudiés. Toutefois, pour le panel des pays de l'UE, les résultats montrent l'existence d'une relation de long terme entre les dépenses et les recettes du gouvernement. Il apparait donc clairement que, sur la période considérée, les pays de l'UE étudiés se sont efforcés de maintenir sous contrôle leurs politiques budgétaires, et particulièrement leurs politiques fiscales et leurs dépenses fiscales.

Une question politique majeure à laquelle ces pays seront confrontés dans les années à venir, sera de savoir si les politiques macroéconomiques sont vouées à l'échec et les conduisent dans une impasse. Quant à l'introduction des programmes de stabilisation macroéconomiques dans les pays de l'UE et dans les pays MED, de toute évidence il n'y aura plus de possibilité et d'espace pour conduire de nouvelles combinaisons de politiques monétaires et fiscales afin de contrôler ces déséquilibres macroéconomiques. Pour des pays méditerranéens tels que le Liban et la Jordanie avec un espace fiscal limité, un taux de change fixe et une ouverture du compte de capital, la politique monétaire est déjà sans effets en termes de stabilisation macroéconomique. L'Egypte a pu améliorer l'efficacité de sa politique monétaire pour faire face aux chocs externes grâce à un choix stratégique de passer à un régime de change flexible. La Tunisie et le Maroc semblent également suivre cette direction. Bien que l'espace fiscal de l'UE soit également limité du fait de l'accumulation de dettes publiques considérables, l'exécution du programme d'assouplissement quantitatif (QE – Quantitatif Easing) de la Banque centrale européenne reste un outil efficace pour assurer la viabilité des politiques fiscales et prévenir le développement de nouvelles crises telle que la crise de la dette grecque.

Avec la crise de la dette actuelle qui se développe dans certains pays de l'UE, les faibles taux de croissance du PIB, les prix du pétrole et les niveaux d'endettement élevés dans plusieurs pays MED, la politique fiscale n'est clairement plus une option de politique macroéconomique eu égard à l'espace fiscal limité. Avec la politique monétaire conduite par la Banque centrale européenne et l'absence d'union politique, les pays de l'UE ont accusé d'importants déficits du compte courant et du budget au cours de ces dix dernières années. Les politiques monétaires resteront sans effet tant que les attentes du secteur privé ne seront pas comblées et que le secteur bancaire restera en mauvaise santé, tout particulièrement les banques italiennes et grecques. La crise de la dette en Grèce a un impact négatif sur le comportement et les attentes des entreprises et des consommateurs, et les mesures d'austérité affectent négativement la demande globale et le taux de croissance du PIB. Particulièrement, la stagnation des salaires et les taux élevés de chômage ont une incidence défavorable sur la

demande intérieure, surtout lorsque la plupart des pays MED et de l'UE ne disposent plus d'espace fiscal suite à l'accumulation de larges dettes publiques et de déficits budgétaires et de la balance commerciale récurrents.

Dans la région MENA, l'inefficacité de la politique monétaire est attribuable à la présence de taux de change fixes et à la libre circulation des capitaux. En conséquence, les politiques gouvernementales (fiscales et monétaires) sont dans l'impossibilité de faire face aux déséquilibres macroéconomiques actuels, ouvrant ainsi la voie à de futures crises financières et monétaires. Par conséquent, les gouvernements européens et méditerranéens devront : (1) réduire le la taille du secteur public en faveur du secteur privé ; (2) canaliser les liquidités vers le secteur privé par des prêts et en encourageant les investissements pour des entreprises productives ; (3) réduire les dépenses du gouvernement et augmenter les taxes du côté de l'offre. Enfin, et étant donné l'inefficacité tant des politiques fiscales que monétaires, le secteur public doit exercer un rôle central pour faire face aux défis d'envergure que représentent les déséquilibres macroéconomiques, en améliorant en premier lieu ces attentes en Europe comme en Méditerranée. Ceci devrait avoir pour effet d'augmenter le taux de croissance du PIB et de rendre la dette plus viable. Ensuite, les mesures d'austérité et d'ajustement structurel pourront être introduites. Cela assurera alors une croissance économique durable, et réduira grandement les risques de futures crises de la dette et de crises monétaires.

Twin Deficits and the Sustainability of Macroeconomic Policies in Selected European and Mediterranean Partner Countries: Post Financial and Debt Crises

1. Introduction

The last two decades have witnessed a dramatic and fundamental shift in fiscal policies of many developed and developing economies. Balanced budgets and current accounts have virtually disappeared, and government deficit financing has prevailed. This resulted into the numerous debt and financial crises that have erupted since early 2000. Policy makers and academics have thus been recently devoting efforts to first assess the soundness of the external and public sectors, and then attempt to forecast whether macroeconomic policies are sustainable. In the instance where macroeconomic policies are not sustainable, then reforming economic policies through the introduction of various austerity and structural adjustment measures will be a must in avoiding fiscal, debt, currency and perhaps banking crises.

However, the timing of the introduction of the various austerity measures remains a concern, given the recessionary environment that the European Union (EU) and the Mediterranean (MED) regions have been experiencing since the 2008 United States (US) financial crisis. It is believed that the newly introduced fiscal adjustment measures would keep the EU and the Mediterranean Partner (MPs) countries in recession which will further worsen the existing budget and current account deficits, as well as, the debt burden and would hamper any future effort to grow out of the accumulated public debt through higher real Gross Domestic Product (GDP) growth rates. Moreover, the accumulated EU and MED national debts are the result of both economic but more importantly of political/institutional factors (Neaime 2015b). Therefore, austerity measures alone may not resolve the current fiscal difficulties but should be accompanied with other political/institutional corrective measures.

In the wake of the recent EU debt crises, the 2008 US financial crisis and the worldwide triple dip recession of the past nine years, the solvency of some EU countries has become a major source of concern for the EU, endangering its financial/economic integration efforts, and the successful monetary unification through the introduction of the euro currency. It is well known that Greece, Portugal, Ireland, Italy, and Spain have been running budget deficits for the past two decades averaging between 5 and 10 percent of GDP, resulting in a EU's public debt averaging above 120 percent of total GDP in 2016 (Eurostat., 2016). The picture is quite similar in the MPs where social, political and military tensions have aggravated even further an already deteriorating macroeconomic situation.

As a result, policy makers have introduced various austerity measures in order to curb and limit further deteriorations in the EU and MED fiscal and macroeconomic positions, despite genuine fear that these measures could collapse aggregate demand, worsen the already high unemployment rates, and further lower prices. If domestic prices decline through aggressive wage and income cuts as dictated by the various austerity programs, the respective real exchange rate will depreciate so as to make domestic goods more competitive internationally. While this policy may improve the current account deficits of Greece, Portugal, Ireland, Spain and Italy, and that of the MPs, it is expected to lead to painful domestic adjustment measures, as a significant number of domestic firms will likely shut down, worsening further the EU and MPs unemployment rates.

Turning to the macroeconomic literature, studies analyzing the twin deficit hypothesis and public sector's fiscal and financial vulnerabilities have considered closely the issues of debt sustainability and the Twin Deficit Hypothesis. Fiscal sustainability can be determined in

various ways, and the literature is rich in studies trying to assess the financial vulnerability of the public sector. This research project makes use of the Present Value Constraint (PVC) framework and the twin deficit hypothesis to look at the issue of fiscal and macroeconomic sustainability in the EU's countries of Greece, Ireland, Italy, Portugal and Spain and a subset of MPs (Egypt, Jordan, Morocco, Tunisia, and Lebanon). This study answers the following questions. How can the EU and MED countries in financial and debt crises curb macroeconomic imbalances (huge public debt, budget and current account deficits) at a time of low economic growth, high unemployment rates, rising inflation, and rising social demands for inclusion? The study also assesses past implemented International Monetary Fund (IMF) macroeconomic policies in light of the various austerity measures that have been introduced. If traditional macroeconomic policies and their modification in the context of the global crises have not helped, are there any new directions that one can think of that will not only solve the current fiscal/debt crises but also prevent future ones from developing? Are we back to the old controversy on fiscal policy versus monetary policy in tackling macroeconomic imbalances? What about the introduction of macroeconomic stabilization programs, is there still room to use both monetary and fiscal policies in tandem to curb those macroeconomic imbalances? Policy makers need to be very careful since joint austerity measures can create a vicious circle whereby recessionary budgets, high interest rates and high levels of public debt tend to reinforce each other.

This being said, and in light of the various austerity measures that have been introduced recently, this study assesses the sustainability of the EU's and MPs current fiscal and macroeconomic policies, and evaluate whether they are violating the twin deficit hypothesis and the inter-temporal budget and external constraints for the public sector. The rest of the study is divided as follows. The next section lays down the theoretical motivation of the paper. Section 3 overviews the macroeconomic developments in the EU and MED's countries over the period 1977-2016. Section 4 offers a thorough discussion of the main empirical results and findings. Finally, section 5 concludes the study with some policy implication.

2. Theoretical Framework

Empirical studies dealing with the issue of fiscal and external sector's sustainability start with the financing constraint of the government. This constraint relates the primary deficit plus nominal debt servicing to changes in outstanding debt. Specifically, the following dynamic equation relates the stock of debt in period t, B_t to last period's debt B_{t-1} plus debt service rB_{t-1}, and the primary surplus (Z):

$$B_t = (1+r)B_{t-1} - Z_t. \quad (1)$$

Z_t will be negative when it represents a deficit and will constitute an addition to the stock of debt, and will be positive when it represents a surplus. B_t is the outstanding debt at the end of period t, and r equals the ex post return on government debt, and it is assumed to be constant.[1] Given the time paths for r and Z_t, the government financing constraint in (1)

[1] Equation (1) may be interpreted in nominal or real terms. However, the empirical literature on debt sustainability suggests that the use of macroeconomic variables in real terms may be more robust, and empirical tests are more likely to be satisfied if one considers real debt (i.e. nominal debt divided by a price index such as the Consumer Price Index). Hence, r and Z_t may be interpreted as the real interest rate and real primary surplus.

describes the time path of the stock of debt, i.e., the dynamics of debt accumulation or decumulation. [2]

Iterating equation (1) forward n periods and summing up we get

$$B_{t-1} = \sum_{j=0}^{n} \frac{R_{t+j}}{(1+r)^{j+1}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{n+1}}{(1+r)^{n+1}}, \tag{2}$$

where G is government expenditures defined to exclude interest payments, and R is government tax revenues. If the last term in (2) approaches zero as the number of periods increases, then the No-Ponzi-Game Constraint will be satisfied, i.e.,

$$\lim_{n\to\infty} \frac{B_{n+1}}{(1+r)^{n+1}} = 0. \tag{3}$$

The No-Ponzi-Game Constraint (NPG) in (3), also known in the literature as the intertemporal solvency condition is stating that the present value of the government's debt in the indefinite future converges to zero. For this to occur, debt B in the numerator must grow more slowly than the rate of interest r. The government cannot finance interest payments on debt by continuously issuing new debt. This will happen when equation (3) is not violated, and equation (2) reduces to

$$B_{t-1} = \sum_{j=0}^{\infty} \frac{R_{t+j}}{(1+r)^{j+1}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}}. \tag{4}$$

If we assume that public debt is growing over time at a constant rate δ to have $B_{t+j} = (1+\delta)B_{t+j-1}, \forall j$, we can rewrite equation (3) as follows

$$\lim_{n\to\infty} \left(\frac{1+\delta}{1+r}\right)^{n} B_0 = 0. \tag{5}$$

For equation (5) to converge to zero, δ should be less than r, i.e., the rate of growth of debt should be less than the real interest rate. On the other hand, the literature relates the Present Value Constraint (PVC) to the accounting approach to assess fiscal sustainability by focusing on debt ratios to GDP. We know that current period GDP, Y_t is equal to last period's GDP, Y_{t-1}, plus Y_{t-1} times the GDP growth rate (g) as follows:

$$Y_t = (1+g)Y_{t-1} \tag{6}$$

Therefore, expressing equation (1) as ratios to GDP would give:

$$\frac{B_t}{Y_t} = (1+r)\frac{B_{t-1}}{Y_t} - \frac{Z_t}{Y_t} \tag{7}$$

Substituting (6) into (7) and solving for the debt to GDP ratio we get:

[2] According to equation (1), If the government runs a primary surplus equal to zero ($Z_t = 0$), the stock of debt will grow at a rate equal to the interest rate: $\Delta B_t = rB_{t-1}$. If the government runs a primary deficit ($Z_t < 0$), the stock of debt will grow at a rate exceeding the interest rate. If the government runs a primary surplus ($Z_t > 0$), the stock of debt will grow more slowly than the interest rate. If the surplus more than offsets payments on existing debt (i.e. the conventional surplus, $Z_t + r B_{t-1}$ is positive), then the debt will actually shrink over time.

$$\frac{B_t}{Y_t} = \frac{(1+r)}{(1+g)}\frac{B_{t-1}}{Y_{t-1}} - \frac{Z_t}{Y_t}.$$

Rewriting we obtain:

$$b_t = \frac{(1+r)}{(1+g)} b_{t-1} - z_t, \tag{8}$$

where small letters refer to ratios of the corresponding variable to GDP. Rearranging (8) and solving for z we get:

$$z_t = \frac{(1+r)}{(1+g)} b_{t-1} - b_t. \tag{9}$$

An important question is how can the EU and MED debts be stabilized within the context of the above specification? If debt is stable, then debt would not grow overtime. That is

$$b_{t-1} = b_t . \tag{10}$$

Plugging (10) in (9), and solving we get

$$z_t = \frac{(r-g)}{(1+g)} b_{t-1} \tag{11}$$

Given the the fact that the EU's economies and the MPs have been in a recession since the 2008 US financial crisis, the EU's and MPs average growth rate of GDP (g) can safely be considered to be close to zero. The above expression can therefore be approximated as:

$$z_t = (r-g) b_{t-1} \tag{12}$$

For the EU's and MPs debt to stop growing overtime equation (12) must hold. Therefore, debt depends on the spread between the real interest rate r and the growth rate of GDP g. If g > r, then debt stabilizes even in presence of a budget deficit (i.e., z is negative). If r = g, then debt stabilizes since the budget is balanced. If r > g, then debt will keep on growing over time even in the presence of a budget surplus, (i.e., z is positive). Tables 1 and 2 indicate that for most EU and MED countries r > g. This implies that debt will keep on growing even if the introduced austerity measure will produce a budget surplus. It is thus clear that debt is rather unsustainable in the EU and MED sample countries under consideration. These casual stylized facts will be further substantiated below with more formal time series econometric tests.

A consistent debt containment policy should first ensure that the EU and MPs countries' real interest rates r are lower than the real GDP growth rates g (g > r).[3] This may be achieved in the EU through for instance the European Central Bank (ECB) lowering interest rates through the monetization of the EU's debt.[4] Under this scenario, the ECB would issue euros to buy back European government bonds, mainly those pertaining to Greece, Italy, Portugal, Ireland, and Spain. This would both decrease public debt pressures and boost investment and exports through lower real interest rates and a depreciated euro, improving subsequently the rate of growth of real GDP. This is the quantitative easing (QE) policy which the ECB effectively introduced in 2015. Another scenario, would be to increase the EU's real GDP growth rate (g) through the introduction of various stimulus packages to be

[3] If g is higher than r, then permanent deficits would be even an acceptable short term solution (see Chalk (2000). This does not imply, however, that, if this condition holds, there is no limit to government borrowing as suggested by Blanchard et al. (1990). Governments cannot run any Ponzi scheme and simply wait to outgrow its liabilities. Deficits are sustainable only if they are not too large.

[4] See also Mora et al. (2013), Mansoorian and Neaime (2000, 2003) and Neaime (2004, and 2010).

financed by Eurobonds. This would insure the reduction of the EU's debt. A third scenario would be to adjust the budget balance. Accordingly, in the short run, the EU's governments could even maintain a moderate debt-decreasing deficit which would sustain economic growth in the short to medium run until the recession is officially over. For some MPs, the macroeconomic situation is different. With fixed exchanges rate regimes in place (for instance in Jordan and Lebanon), an open capital account, monetary policy became ineffective and could no longer be used to stimulate the rate of growth of real GDP. Alternative policies will therefore be assessed and proposed.

Table 1. EU Real GDP Growth and Real Interest Rates (in %), 2011-2016

Long-Term Interest Rate	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Greece	15.7	22.5	10.1	6.9	9.8	8.4
Ireland	9.6	6.2	3.8	2.4	1.2	0.7
Italy	5.4	5.5	4.3	2.9	1.7	1.5
Portugal	10.2	10.5	6.3	3.8	2.4	3.2
Spain	5.4	5.8	4.6	2.7	1.7	1.4
Real GDP Growth	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Greece	-9.10	-7.30	-3.20	0.40	-0.20	0.30
Ireland	0.00	-1.10	1.10	8.50	26.30	3.70
Italy	0.60	-2.80	-1.70	0.10	0.80	0.90
Portugal	-1.80	-4.00	-1.10	0.90	1.60	1.40
Spain	-1.00	-2.60	-1.70	1.40	3.20	3.20
[r-g]	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Greece	24.8	29.80	13.3	6.5	10	8.1
Ireland	9.6	7.30	2.7	-6.1	-25.1	-3
Italy	4.8	8.30	6	2.8	0.9	0.6
Portugal	12	14.50	7.4	2.9	0.8	1.8
Spain	6.4	8.40	6.3	1.3	-1.5	-1.8

Sources: Long-Term Interest Rate: Euromonitor International from national statistics/OECD; Real GDP Growth: Euromonitor International and the IMF's World Economic Outlook (WEO).

Table 2. MED Real GDP and Real Interest Rates (in %), 2011-2016

Long Term Real Interest Rates (r)	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Egypt	-0.51	-5.27	3.02	0.18	0.62	-
Jordan	2.2	-0.2	-1.3	1.1	1.3	2
Lebanon	4.02	1.68	5.51	5.92	5.54	-
Morocco	-	20.7	23.3	24.8	26.9	28.3
Tunisia	3.5	3.3	4.8	4.7	-	-
Real GDP Growth Rates (g)	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Egypt	1.80	2.20	2.10	2.20	4.20	4.30
Jordan	2.60	2.70	2.80	3.10	2.40	2.00
Lebanon	0.90	2.80	3.00	1.80	1.50	1.70
Morocco	5.20	3.00	4.50	2.60	4.50	1.80
Tunisia	-1.90	4.20	2.50	2.40	0.90	1.40

[r- g]	2011	2012	2013	2014	2015	2016
Egypt	-2.31	-7.47	0.92	-2.02	-3.58	-
Jordan	-0.4	-2.9	-4.1	-2	-1.1	0
Lebanon	3.12	-1.12	2.51	4.12	4.04	-1.7
Morocco	-	17.7	18.8	22.2	22.4	26.5
Tunisia	5.4	-0.9	2.3	2.3	-	-

Sources: Long-Term Interest Rate: Euromonitor International from national statistics/OECD; Real GDP Growth: Euromonitor International and the IMF's World Economic Outlook (WEO).

On the other hand, to explore the sustainability of external debt and the current account deficit, we use the government inter-temporal external constraint which relates external debt accumulation in period t+1, denoted by B_{t+1}, to debt service and net exports as follows:

$$B_{t+1} = (1+r)B_t - NX_{t+1}. \tag{13}$$

Where NX_{t+1} represents net exports in period t+1, r is the nominal interest rate, and rB_t is external debt service in period t. Iterating equation (13) forward n periods and summing up we get the government's external inter-temporal constraint:

$$B_t = \sum_{j=1}^{n} \frac{NX_{t+j}}{(1+r)^{j+1}} + \lim_{n\to\infty} \frac{B_n}{(1+r)^n}. \tag{14}$$

If the last term in (14) approaches zero as the number of period increases, then the NPG constraint will be satisfied, i.e.,

$$\lim_{n\to\infty} \frac{B_n}{(1+r)^n} = 0. \tag{15}$$

The NPG constraint in (15) is stating that the present value of external debt in the indefinite future converges to zero. For this to occur, external debt B in the numerator must grow more slowly than the rate of interest r. The government cannot finance interest payments on external debt by continuously issuing new external debt. This will happen when equation (15) is not violated, and equation (14) reduces to

$$B_t = \sum_{j=1}^{n} \frac{NX_{t+j}}{(1+r)^{j+1}}. \tag{16}$$

Finally, to study the Twin Deficit Hypothesis, we start with the theoretical relationship between fiscal and current account deficits which is based on the standard National Income Identity (NII):

$$Y = C + I + G + (CA) \tag{17}$$

where Y is GDP, C is household consumption expenditure, I is investment expenditure, G is government expenditure, and the current account $CA = X - M$, where X is total exports of goods and services and M is total imports of goods and services. One can also define macroeconomic savings as the sum of private saving ($Sp = Y - T - C$) and government saving (Sg=T –G). Using equation (17), one can rewrite macroeconomic savings as follows:

$$S = Sp + Sg = Y - T - C + (T - G) = I + CA, \tag{18}$$

which can be rearranged as:

$$CA = Sp - I + (Sg). \tag{19}$$

Equation (19) implies that CA depends simultaneously on the private saving deficit (represented by the difference between private saving and investment ($Sp - I$) and the fiscal deficit (Sg). However, this equation is an accounting identity; it is not based on any theory of economic behavior, and it does not help in forecasting the results of policies without the introduction of formal macroeconomic modelling that pertains to a given economy.

Assuming that the private saving deficit is stable over time, equation (19) shows that fluctuations in the government balance can affect the current account (a relationship known in the macroeconomic literature as the Twin Deficits Hypothesis). One policy implication is that governments can use fiscal policy to monitor both their current account and the government budget balance. However, the relationship becomes more ambiguous when one takes into account the behavior of economic agents. For instance, under the Ricardian Equivalence, an increase in public deficits should induce agents to save more, while simultaneously increasing the interest rates via a risk premium, which should lower private investment. In cases where the resulting increase in $Sp - I$ offsets the initial negative impact on Sg, an inverse relationship is observed: the deterioration of the public balance actually results in an improvement in the current account. This negative relationship increases in periods of recessions, where the general decline in demand lowers the level of private investment, decreases the demand for imports and thus further improves the current account balance (see Kim and Roubini, 2008). Assuming that Sp is context-dependent (for instance, the level of household and corporate debt depends on the possibilities offered by financial markets, especially in open economies), there is a case for arguing that no clear connection should be observed between the fiscal and current account deficits. The neoclassical case for a dichotomy between the current account and the government balance can be found in Barro (1989). He argued that economic agents rationally expect that a higher fiscal deficit will result in higher taxes in the future, and therefore react by increasing their current savings by the corresponding amount, leaving the interest rate, investment and the current account balance unchanged. [5]

Finally, note that the direction of causality may very well run from the current account to the public balance: lower imports, while they contribute to an improvement in the current account may also decrease the volume of government revenues from tariffs. In addition, a government may loosen its fiscal discipline in case of a sudden improvement in both the trade balance and economic growth. In this case, an unexpected improvement in the trade balance would actually decrease the public balance. Overall, the dynamic relationship between the trade balance and the government balance is ambiguous. One influential model, formulated by Blanchard and Giavazzi (2002) has emphasized factors related to economic and financial integration. In particular, the reduction in interest rate spreads and in currency risk due to nominal convergence, which, for net borrowing countries, increase private investment and reduce national savings. Unless the government's budget balance moves sufficiently in the opposite direction, this channel implies an increase in the current account deficit to GDP ratio. This prediction of the model turned out to be particularly relevant in the years that followed the Great Recession.

However, as highlighted in Kumhof and Douglas (2009) the empirical literature on the link between fiscal and external deficits has produced very mixed and inconclusive results, as existing studies employ different methodologies, use different data samples, measure budget and current account deficits differently, reaching, therefore, different results. The literature on Southern EU and MED countries is particularly scant. We can nonetheless outline a couple of examples. For the Greek case, Vamvoukas (1999) concluded that there was a predominantly unidirectional causality running from the budget deficit to the trade deficit in both the long-

[5] For a detailed discussion of empirical work related to twin deficits see Neaime (2015a, 2008, and 2004).

and short-run in between 1948 and 1994. For Turkey, Acaravci and Ozturk (2008) also rejected the Ricardian Equivalence Hypothesis and supported the view of a long-run relationship between budget deficits and current account imbalances. Finally, in a study focusing in Egypt, Marinheiro (2008) finds evidence of a reverse Granger-causality between the external deficit and the budget deficit. The objective of the empirical section below is, therefore, to document the Twin Deficit Hypothesis in the context of MED and peripheral EU economies using a comprehensive set of empirical methods.

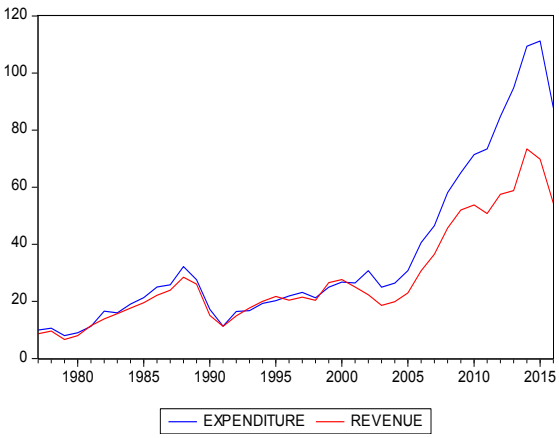
3. Macroeconomic Developments in Selected EU and MED Countries: 1977-2016.

The 2008 financial crisis and the 2011 EU's debt crisis, as well as, the economic and political uncertainty that has characterized the MED region since the uprisings of 2011 continue to dampen the prospects for growth, job creation, fiscal balances and macroeconomic stability. Limited fiscal space, fixed exchange rates, and the presence of open capital accounts have rendered government macroeconomic policies ineffective in several MED countries. Central banks have adopted policies that were not in consonance with the received wisdom. Quantitative easing polices implemented in the West and Japan did not yet succeed in achieving macroeconomic stability. The massive injection of money in the US since 2008 and in the EU since 2015 has just started to impinge on growth and inflation.[6]

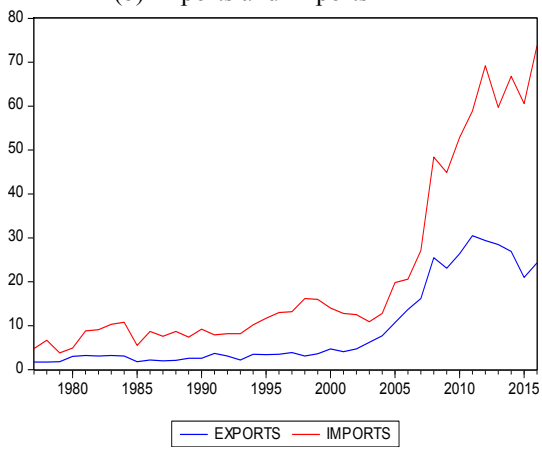
No doubt, the 2008 financial crisis and the 2011 European debt crisis and the subsequent triple dip worldwide recession have adversely affected the macroeconomic fundamentals of the MED region. It is clear that in the MED countries of Egypt, Jordan, Lebanon, Morocco and Tunisia current account and budget deficits started widening since 2008. All the MED countries started registering a significant fall in exports and government revenues and an increase in foreign and total public debts. The deteriorating macroeconomic outlook was accompanied by social and political unrest in several MED countries which have also contributed in deteriorating further the regional growth prospects putting further strains on the sustainably of fiscal and monetary policies.

Figure 1. Macroeconomic Developments in Egypt: 1977–2016 (in USD billion).

(a) Government Expenditure and Revenues



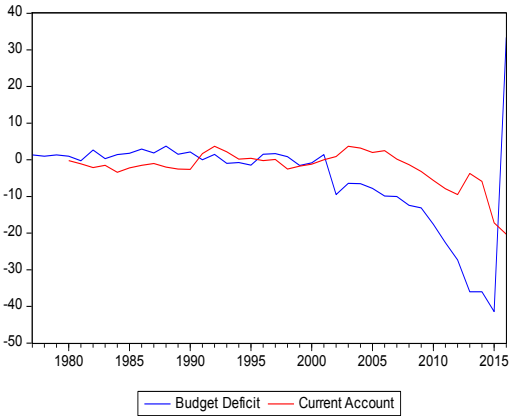
(b) Exports and Imports

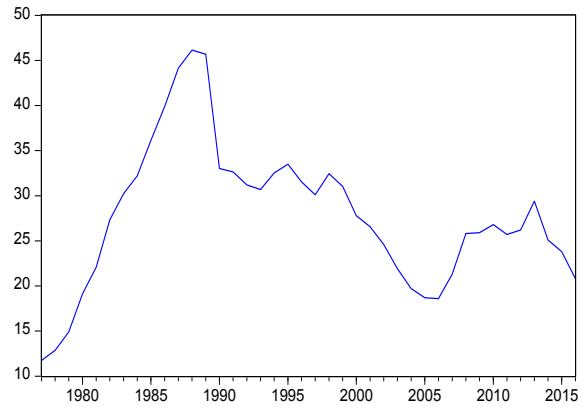


(c) Budget Deficit and Current Account

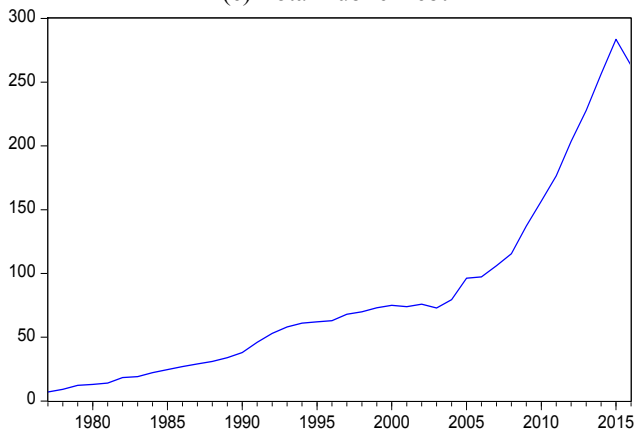
(d) Foreign Debt

[6] For a detailed discussion of the implications of the recent financial and debt crises see Neaime and Gaysset (2017), Neaime (2016, and 2012a&b).





(e) Total Public Debt



Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

We now take a closer look at the recent macroeconomic developments in each specific country in the MED region over the last three decades. Figure 1 (a) above indicates that Egypt's government expenditures and revenues have been drifting far apart since 2005. Moreover, Egypt's budget deficit has been widening exponentially since the 2008 financial crisis, registering a deficit of United States Dollars (USD) 40 billion in 2015 (Figure 1(c)). This translated into a huge public debt which started to increase exponentially after 2005 to reach USD 260 billion in 2016 (Figure 1 (e)).

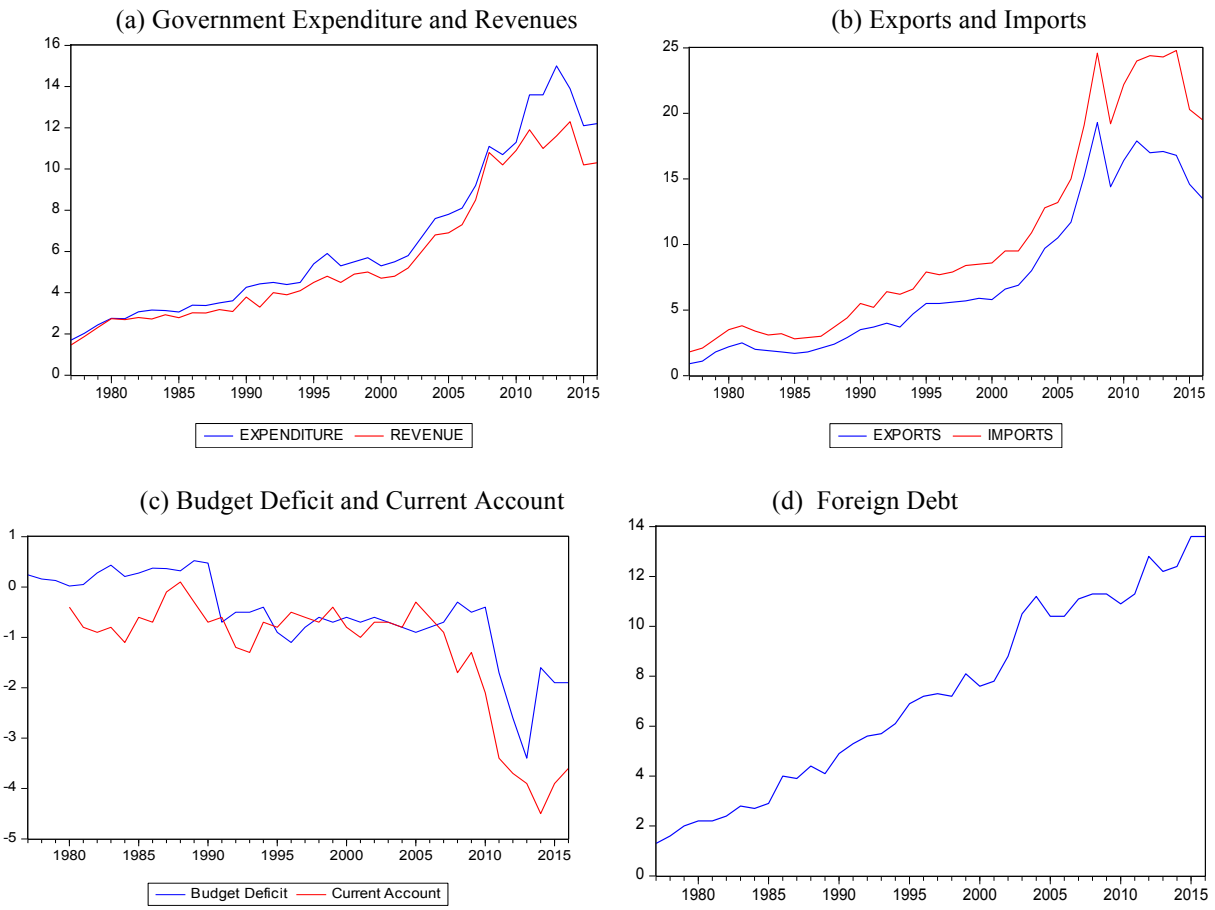
The same is true for Egypt's exports and imports where the two series appear to be drifting apart since 2008 (Figure 1 (b)). Egypt has also been registering a deteriorating foreign debt since 2006, peaking at about USD 30 billion in 2013 (Figure 1(d)). The recent float of the Egyptian pound is expected to stimulate exports and reduce the current gap that exists between exports and imports, alleviating thus the huge recent current account deficits. Moreover, the move to a floating exchange rate regime is expected to render monetary policy more effective in dealing with future domestic and foreign nominal shocks. Despite the short term pain that resulted from the recent move to a flexible exchange rate system, this will soon be dissipated as a result of the expected long term gain in terms of higher levels of exports, further reductions in the current account deficit, lower real interest rates and higher levels of real GDP growth rates.

In Tunisia, the gap between exports and imports has been persistent since the early 1980s. Figure 2 (b) depicts a significant gap between the two series which has started to widen even further since the 2008 financial crisis. Tunisia has been experiencing persistent decreases in exports accompanied by increases in imports. The signing of the Euro-MED

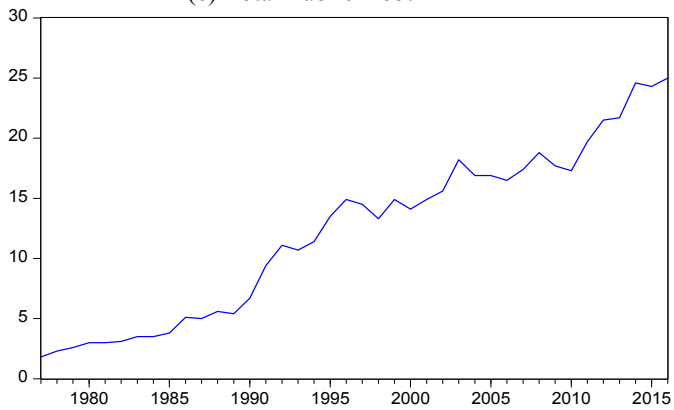
trade agreements seems to have put Tunisia at a comparative disadvantage, as Tunisia's trade balance and competitiveness were adversely affected by those agreements.

Despite sound fiscal policies adopted over the last three decades, the gap between government expenditures and revenues started to widen after 2009 (Figure 2 (a)). This subsequently translated into consecutive government budget deficits over the same period (Figure 2(c)). However, and despite deteriorating fiscal deficits, total public debt has somehow remained under control with a slight increase after the 2008 financial crisis, but has remained below the USD 25 billion threshold (Figure 2 (e)). Moreover, Tunisia's foreign debt registered a steady increase since 1980, peaking at USD 13 billion in 2016 (Figure 2 (d)). Finally, Figure 2 (c) shows that both the current account and budget deficit series have been deteriorating over time and appear to be moving together. Tunisia's budget deficit reached USD 3.5 billion in 2014, registering the highest deficit over the whole period under consideration. The same is true for the current account deficit deteriorating to USD 4.5 billion during the same year.

Figure 2. Macroeconomic Developments in Tunisia: 1977–2016 (in USD billion).



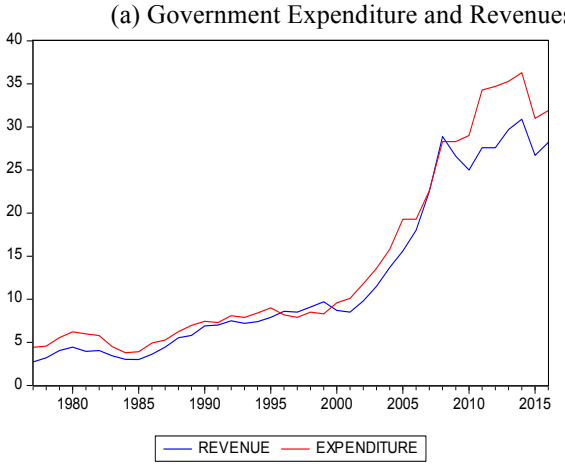
(e) Total Public Debt



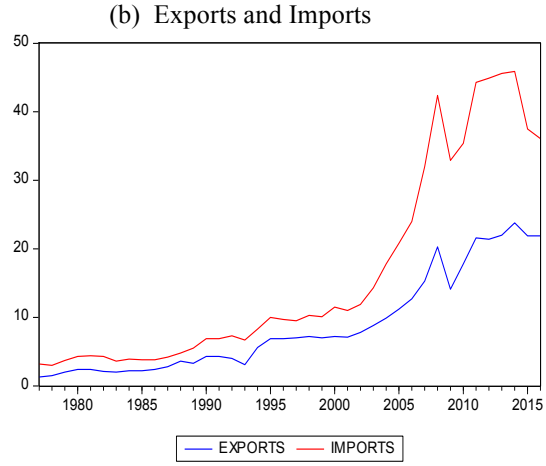
Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

Figure 3. Macroeconomic Developments in Morocco: 1977–2016 (in USD billion).

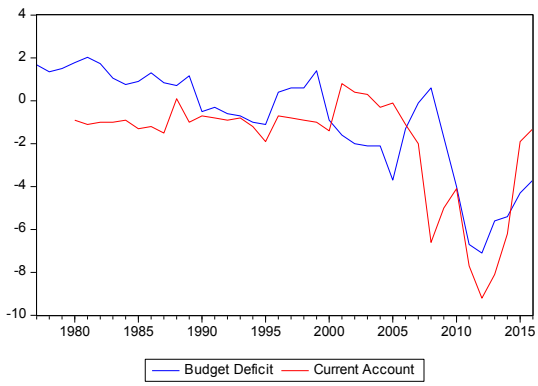
(a) Government Expenditure and Revenues



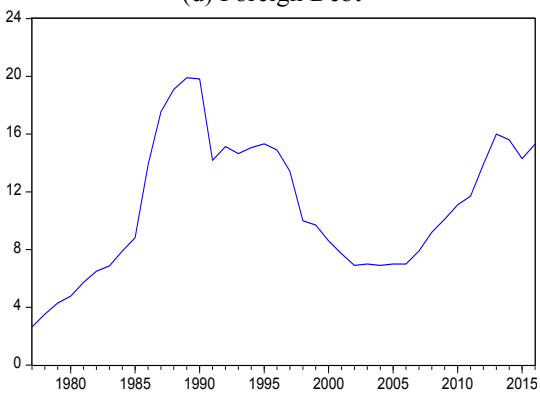
(b) Exports and Imports



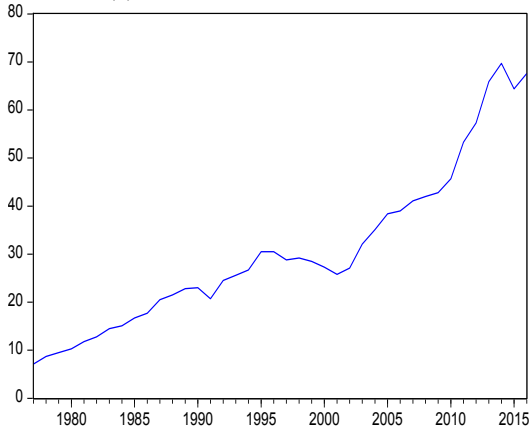
(c) Budget Deficit and Current Account



(d) Foreign Debt



(e) Total Public Debt



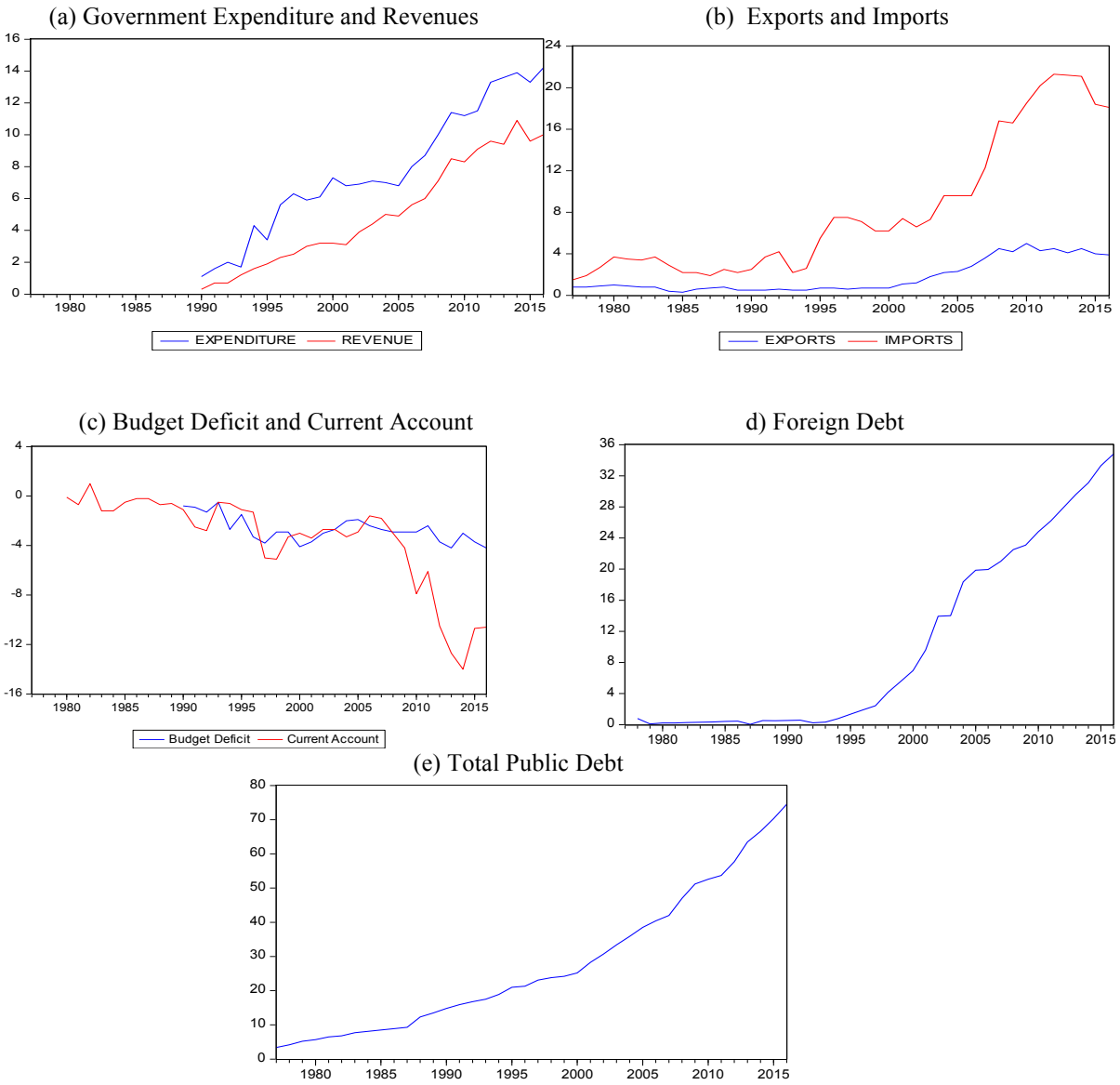
Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

Similar macroeconomic dynamics are observed in Morocco with a widening gap between exports and imports since 2008 (Figure 3 (b)). Imports have been on the rise while exports have been on a steady decline. After a series of slight current account deficits since the early 1980s, significant deficits started to be registered after 2008 with a remarkable deficit of USD 9 billion in 2012 (Figure 3 (c)). After the adoption of sound fiscal policies for the past three decades, Morocco's government revenues and expenditures started drifting far apart since the 2008 US financial crisis (Figure 3 (a)). This translated into mild budget deficits over the same period (Figure 3 (c)) but with a deteriorating public debt which started to increase exponentially after 2005 to reach USD 70 billion in 2016 (Figure 3 (e)). Finally, Figure 3 (d) points to some volatility in Morocco's foreign debt levels. After succeeding in reducing foreign debt to about USD 8 billion in 2005, from a high of USD 20 billion in 1989, foreign debt has been on the rise since 2005, registering a high of USD 16 billion in 2014.

Figure 4 (b) indicates that Lebanon's exports have been slightly growing over the past two decades with the exception of the period 2011-2015, due to the negative economic spillovers from the Syrian Crisis and the huge influx of Syrian refugees in the order of 1.5 million. The gap between exports and imports started widening significantly after 2008, resulting in consecutive current account deficits, reaching USD 14 billion in 2015 (see Figure 4(c)). The pursuit of a fixed exchange rate system since the mid-1990s has rendered monetary policy ineffective in dealing with domestic and foreign financial shocks. A sound current macroeconomic policy is for the Lebanese central bank to try and continue to preserve the current peg to the US dollar. Any sudden move to a flexible exchange rate system, given the deteriorating macroeconomic fundamentals, will have devastating consequences on Lebanon's economy and could trigger a debt and currency crisis.

Lebanon's persistent budget deficits are the result of high levels of debt service and the yearly transfers to the the Electricité du Liban (EDL) which are estimated at USD 1.5 billion per year. Budget deficits increased from USD 1 billion in 1993 to USD 3 billion in 2005, and have been consistently hoovering around USD 4 billion, and amounting to about 8% of GDP (Figure 4(c)). Foreign debt has accelerated right after the end of civil war in 1990. The alarming increase in foreign debt can be attributed to an expansionary fiscal policy and Lebanon's massive reconstruction scheme adopted in order to rehabilitate the country's destroyed infrastructure. Foreign debt has thus been increasing exponentially from a low of USD 3 billion in 1993 to about USD 32 billion in 2016 (Figure 4 (d)). Total public debt reached USD 77 billion in 2017, and amounted to about 170% of GDP; the highest amongst the 5 MED countries under investigation (Figure 4(e)).

Figure 4. Macroeconomic Developments in Lebanon: 1977–2016 (in USD billion).



Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

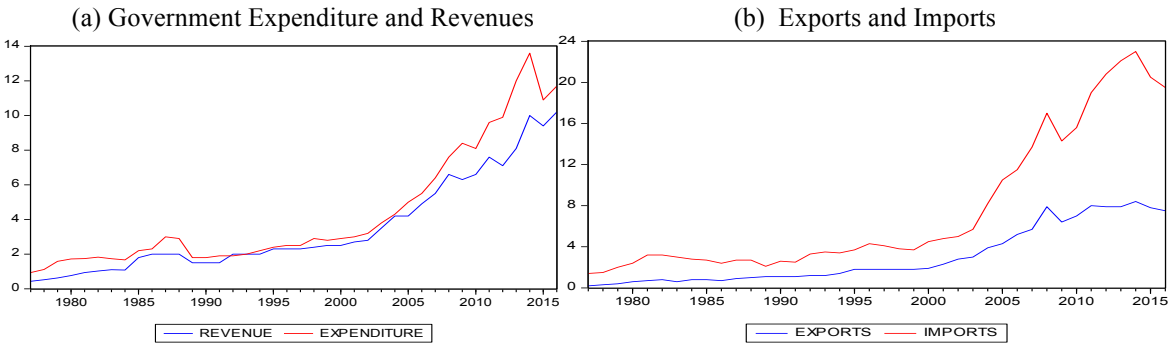
The Lebanese government has recently approved a 120% increase in the salary scale of public employees, paving thus the way for an estimated additional budget burden of US$ 1.5 billion. The public salary adjustment came as a result of tremendous cumulated economic/political pressure. Such salary increase, which has been randomly granted without securing adequate revenues to finance it has started to impinge negatively on the rate of inflation. While it is expected to further worsen the budget and current account deficits, it has already started to put further pressure on the pegged exchange rate regime to the US$ and on the balance of payment, and might impact negatively on the already declining trend in capital inflows (portfolio and foreign direct investments). After a surplus of about US$ 8 billion in 2010, the balance of payment has been on a declining trend reaching a deficit of US$ 1.1 billion during the first quarter of 2017.

Lebanon's permanent current account deficits have so far been offset, and to a great extent, by remittances estimated at US$ 7 billion per year, and by surpluses in the capital account due mainly to foreign direct and indirect investments. If these capital inflows decline, as a result of the newly introduced salary scale adjustment, the central bank will have to tap once again its foreign exchange reserves. During the recent political turmoil, and just before the election of a new president, the central bank lost the equivalent of US$ 1 billion in trying to maintain its current peg to the US dollar. However, recent estimates of the Banque du Liban (BDL's) foreign exchange reserves put the figure at a new historical high of US$ 43billion, following BDL's new financial engineering operations.

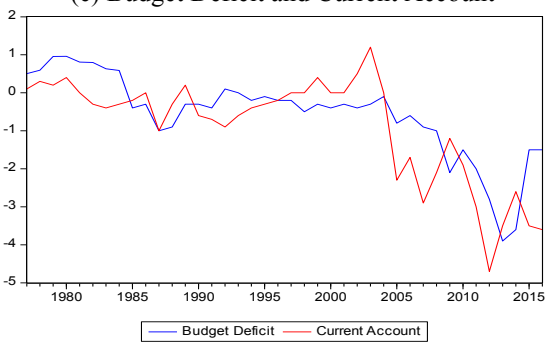
Despite a robust level of foreign exchange rate reserves, if adequate financing is not secured to account for the proposed salary scale increase, the government will then face further budget deficits, and the risk of a downgrade in its sovereign credit ratings to a rating below B, coupled with a Treasury Bill's downgrade to Junk bonds, which will subsequently be considered too risky to be offered on international financial markets. The adoption of the new salary scale may then lead to devastating consequences on domestic interest rates, and on the service of a huge public debt currently estimated at $US 77 billion; amounting to more than 160% of GDP. Despite their good financial position, a decline in Lebanon's credit ratings may also impact the credit ratings of local commercial banks having a significant exposure to the government's public debt; exceeding 65%.

Expected higher public wages will worsen the inflationary pressure due to a rise in local demand. The plausible response to this increase in demand is either through an increase in the demand for imports or through an overall increase in the domestic price of goods and services. The added inflation will further affect monetary stability as the equivalent of 25% of the budget will be injected into the economy and hence, affect negatively the exchange rate peg to the US$. The expansion of imports to meet the increase in domestic demand resulting from the increase in public sector salaries will further worsen a deteriorating current account deficit.

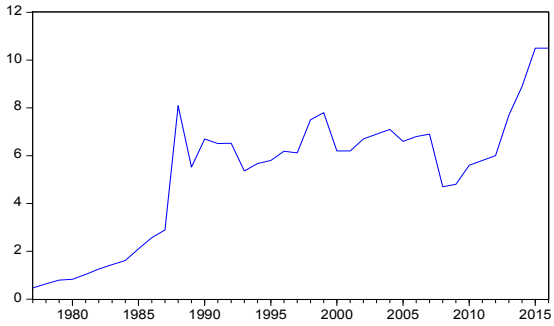
Figure 5. Macroeconomic Developments in Jordan: 1977–2016 (in USD billion).



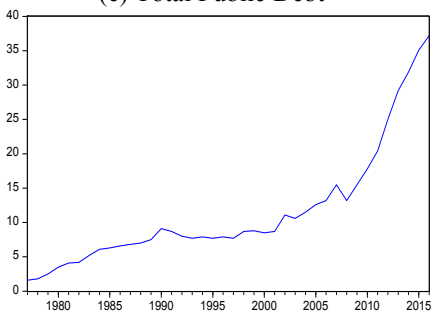
(c) Budget Deficit and Current Account



(d) Foreign Debt



(e) Total Public Debt



Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

Similar macroeconomics dynamics are also observed in Jordan, whereby the gap between exports and imports has started to widen right after the 2008 US financial crisis (see Figure 5 (b)). Exports started increasing significantly post 2000 due to the introduction of trade liberalization policies. Jordan became member of the World Trade Organization (WTO) in 2000, and signed several bilateral trade agreements with the US and several MED countries. However, the increase in exports could not match the significant rise in imports; not only due to the recent financial and debt crises but also due to an overall deterioration of the MED economic outlook after the break out of the so-called Arab Spring and the subsequent influx of Syrian refugees into Jordan as well as the consequences of the war in Iraq. Subsequently, Jordan's current account deficit experienced a threefold increase from USD 1 billion in 2010, to USD 3.5 billion in 2015 (Figure 5 (c)).

Jordan's economy was severely affected by the 2003 invasion of Iraq. The negative spillover effects amounted to: lower levels of exports to Iraq since 2003, as well as lower tourism and transportation sectors' revenues. Subsequently, the government introduced fiscal adjustment measures which included higher public and social expenditures in 2003 funded through external grants (see Figure 5 (a)). Moreover, higher levels of budget deficits are recorded in Jordan post 2011 due to strict fiscal measures introduced by the government in order to protect consumers from external shocks and due to higher energy prices. These measures included higher subsidies and wages, as well as, improved spending on social services. Total public debt started increasing exponentially after the 2008 financial crisis increasing from a little less than USD 15 billion in 2009 to about USD 35 billion in 2016 (Figure 5 (e)).

A noticeable current account surplus of USD 1.3 billion in 2003 has been registered (Figure 5 (c)); the result of Jordan's sound external sector liberalizations policies. Subsequently however, Jordan registered recurrent current account deficits due to multiple exogenous shocks including the 2008 financial crisis and the 2011 Syrian crisis that led to lower levels of tourism revenues, workers' remittances, and foreign direct investments. The current account deficit widened from USD 2.5 billion in 2005, to USD 4.5 billion in 2015

(Figure 5 (c)). Upon the major fluctuations in foreign debt are the upsurges in debt levels post 2008 financial crisis and the 2011 Syrian crisis. Foreign debt experienced a 10-fold increase from USD 1 billion in 1980 to USD 11 billion in 2015 (Figure 5 (d)). The same is true for total public debt with an exponential increase registered right after the 2008 financial crisis, increasing from about USD 15 billion to more than USD 35 billion (Figure 5 (e)).

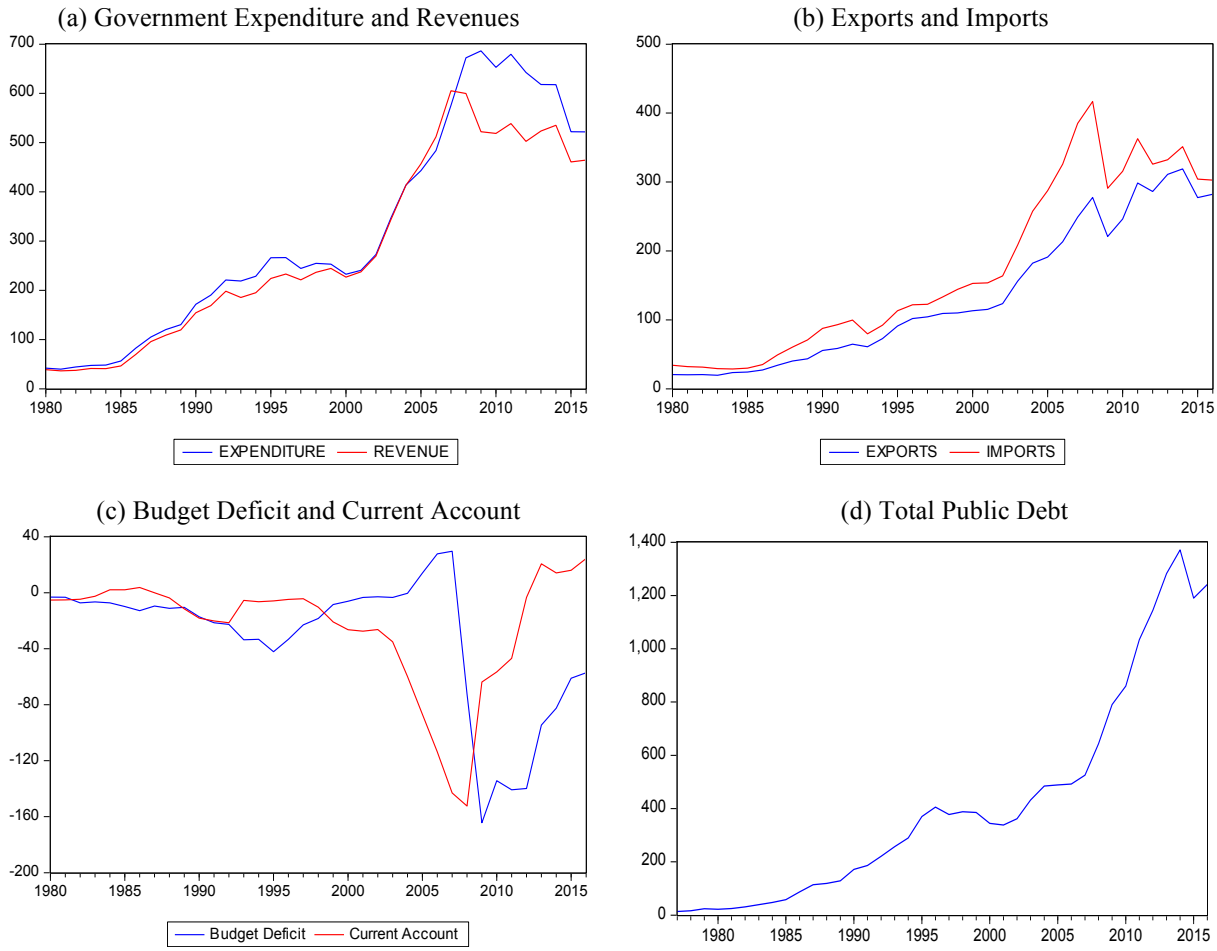
We turn next to the latest macroeconomic developments in the EU over the last three decades. It is clear Greece, Ireland and Spain have been experiencing a decrease in government revenues with a clear widening gap between both government expenditures and revenues since the 2008 US financial crisis. Another key variable for analyzing debt sustainability is the fiscal deficit. A steady increase in the budget deficit would increase the likelihood of debt becoming unsustainable and would contribute to the worsening of the management of public debt. Moreover, a continuous increase in the fiscal deficit through insufficient tax revenues or increased government expenditures or debt service would render debt unsustainable.

In parallel with the above observed macroeconomic fundamentals one should also consider the newly introduced institutional changes that have recently shaped the Eurozone countries since 2002; such as the creation of the European Union and the introduction of the euro currency. The introduction of the euro has reshaped the institutional venue for all Eurozone countries, as well as, their economic fundamentals. For instance, and right after monetary reunification, those economies experienced a reduction in nominal and real interest rate, switching therefore from expenditure on debt service to expenditure on other social goods – often used opportunistically by the elected governments. For some Eurozone countries the unexpected increase in savings ranged between 3-4 % of GDP, despite the fact that government expenditure continued to increase. A case in point is Italy; before joining the Eurozone, Italy's government policies aimed at lowering the budget deficit and total public debt to conform with the Maastricht criteria. However, after the "euro – flag membership" government expenditure and revenues started soaring sharply. Second, during the 2012 recession, fiscal rules became more stringent and the industrial sector (exportable) reacted with a diversification of its sales in the foreign markets (export). It should be noted that the five EU countries under investigation are structurally different and they have pursued very different macroeconomic policies within the "unique market" or EU umbrella in the eighties and nineties, and even after the introduction of the euro and the recent worldwide recession.

We begin our macroeconomic analysis in Spain. Figure 6 (a) points to a widening gap between government expenditures and revenues since the 2008 financial crisis. This transpired into a significant budget (Figure 6 (c). This deterioration is mainly due to several factors including the worldwide recession impinging negatively on Spain's exports and on consumer demand due to low private sector's confidence. This was also accompanied by a fall in tax revenues, higher levels of spending on unemployment benefits, and a severe banking sector's crisis. This subsequently translated into significant increases in public debt. From a low of USD 400 billion in 2008, total public debt started increasing at an exponential rate after the 2008 financial crisis to register a 3-fold increase to about USD 1.2 trillion in 2016 (Figure 6(d)).

Figure 6 (c) also indicates that Spain had its current account deficit under control prior to the 2008 financial crisis. The tremendous inflow of capital prior to the financial crisis had and to some extent undermined Spain's productivity, inflated a housing bubble, and increased private sector's credit. Subsequently, Spain's current account deteriorated to about USD 160 billion during the 2008 financial crisis (Figure 6 (c)). Finally, Figure 6 (b) indicates that Spain's current account was negatively affected by the 2008 financial crisis, where the gap between exports and imports has been widening since. However, this gap started narrowing down after 2011 due to decreases in imports and increases in exports.

Figure 6. Macroeconomic Developments in Spain: 1980–2016 (in USD billion)

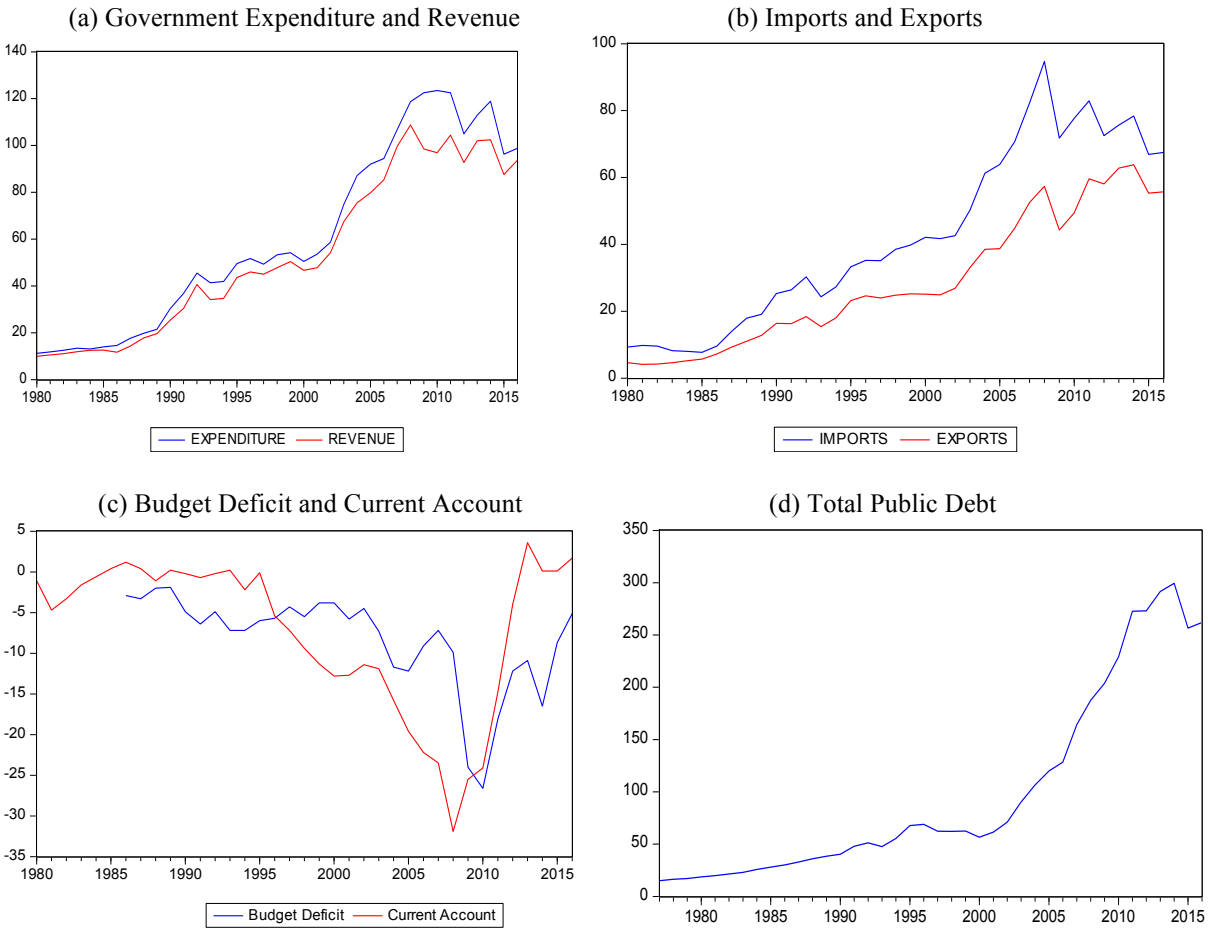


Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

Figure 7 (c) indicates that Portugal's budget balance started deteriorating at alarming rates since the 2008 financial crisis, reaching an all-time high of USD 20 billion right after the crisis. However, and after the introduction of severe austerity measures, as well as, structural adjustment measures, we see a trend reversal and the budget deficits appear to have been put under control. Since joining the EU in 2001, Portugal's total public debt has been on the rise, increasing from USD 50 billion to about USD 300 billion in 2016 (Figure 7 (d)).

Portugal registered the highest current account deficit, USD 30 billion, in 2008 (Figure 7 (c)). This huge deficit was not only attributed to the financial crisis, but also to low exports, high imports and an overall domestic recessionary environment. Similar dynamics are observed for Portugal's budget balance, where after consecutive deficits registered since early 2000, the deficit deteriorated to about USD 25 billion during the financial crisis. Finally, Figure 7 (b) indicates that Portugal's exports and imports have been drifting far apart for the past two decades. Moreover, the gap between the two series has started to widen even further after 2005. Some containment in Portugal's current account deficit is observed due to the introduction of structural reform policies.

Figure 7. Macroeconomic Developments in Portugal: 1980–2016 (in USD billion)

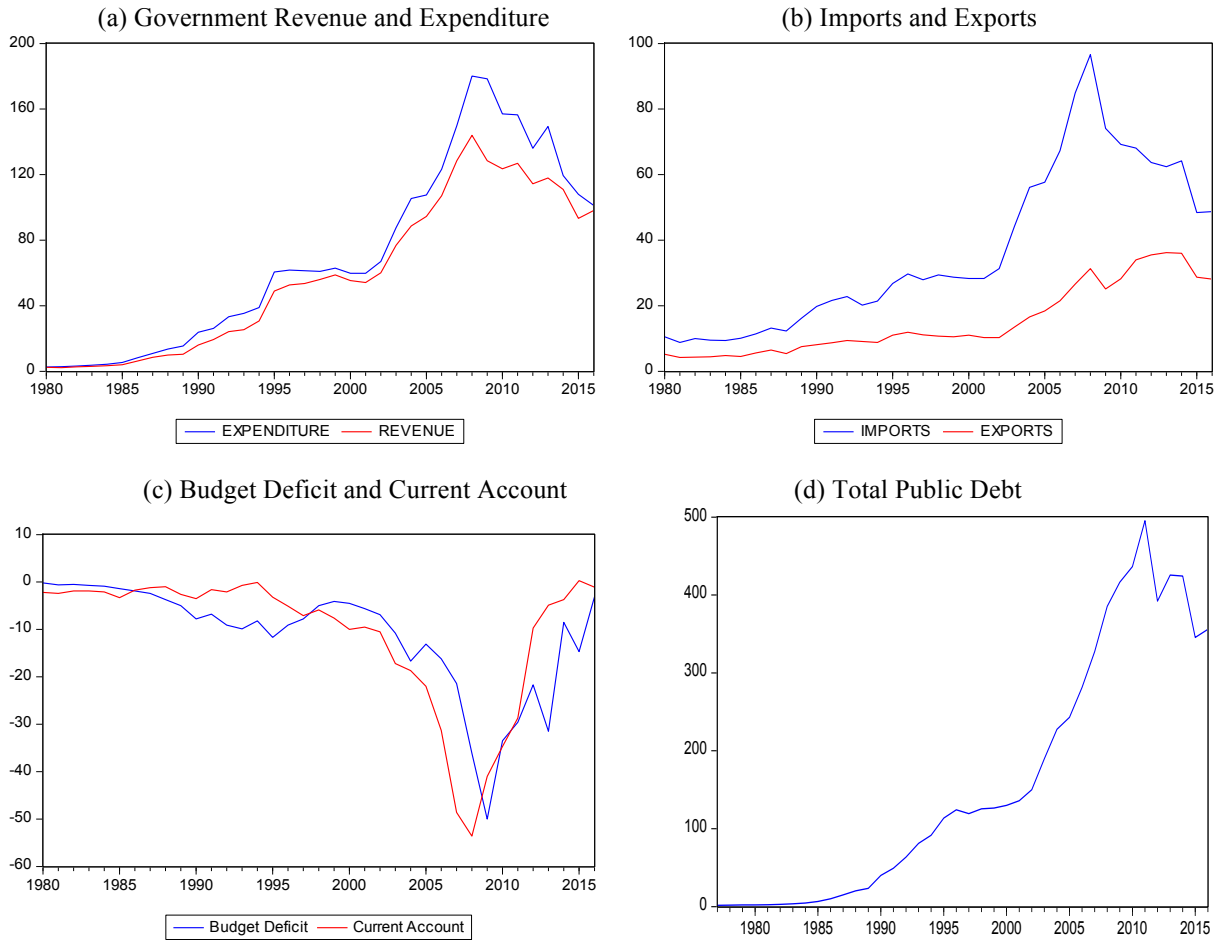


Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

It is well known that among the EU member countries under investigation, Greece was the only country that actually experienced a debt crisis in 2011, triggered not only by the 2008 financial crisis, but also by a deteriorating current account and increasing levels of imports mainly from Germany, since Greece became member of the EU in early 2000 (Figure 8 (b) and (c)). This was also accompanied by dwindling exports, especially during the 2008 financial crisis.[7] Figure 8 (c) indicates that the Greek budget deficit has been steadily deteriorating since 2005, reaching its highest level in 2008 at USD 40 billion. The same is also true for Greece's current account which registered a deficit of USD 25 billion over the same period (Figure 8 (c)). It is well known that Greece lost its competitiveness vis-a-vis Germany since joining the EU in 2001. After 2011, Greece had to introduce various austerity and structural reform measures to abide by the Troika's[8] conditions for the bailout packages. Since joining the EU in 2001, Greece's total public debt has been on the rise, registering a four-fold increase from USD 120 billion to about USD 500 billion in 2016 (Figure 8 (d)).

[7] See also Neaime et al (2017) for a detailed discussion of the Greek debt crisis.
[8] The IMF, the EU, and the ECB.

Figure 8. Macroeconomic Developments in Greece: 1980–2016 (in USD billion)

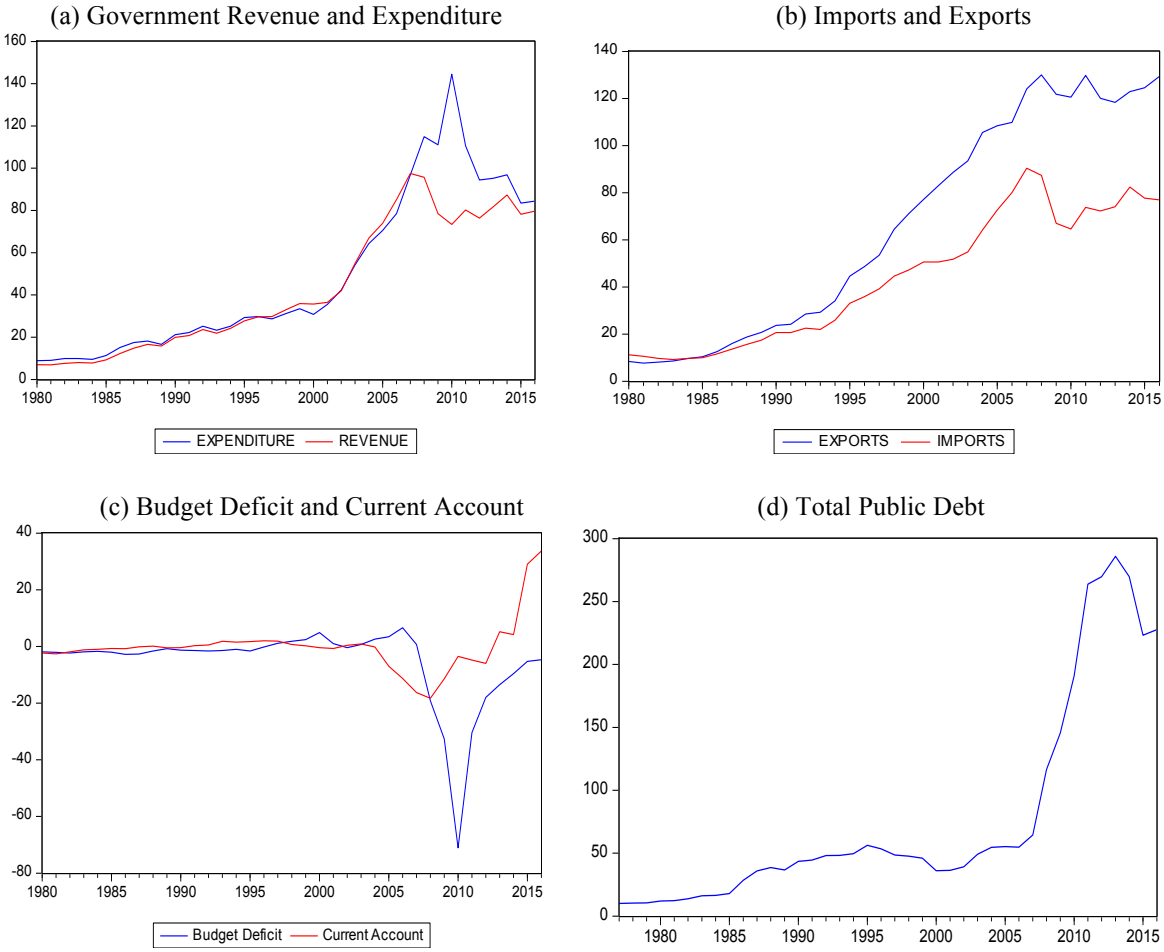


Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

Figure 9 (a) indicates that the gap between Ireland's government expenditure and revenues has started to widen during the 2008 financial crisis. This subsequently translated into a huge budget deficit peaking at USD 70 billion in 2010 (Figure 9 (c)). The same is true for Ireland's total public debt which registered a huge increase since the 2008 financial crisis, increasing from USD 60 billion in 2008, to USD 260 billion in 2016 (Figure 9 (d)).

After consecutive deteriorations in the current account during the financial crisis to about USD 10 billion, there seems to be a trend reversal shortly after (Figure 9 (c)). The current account deficit widened remarkably in between 2008 and 2014 due to higher demand for imports from trading partners and the recessionary environment mainly driven by multi-national companies accounting for a large share of production in sectors that are less sensitive to cyclical fluctuations, such as pharmaceuticals production and medical devices. Moreover, Figure 9 (c) also indicates that Ireland has registered consecutive budget deficits since the 2008 financial crisis, reaching a low of USD 70 billion in 2010.

Figure 9. Macroeconomic Developments in Ireland: 1980–2016 (in USD billion)



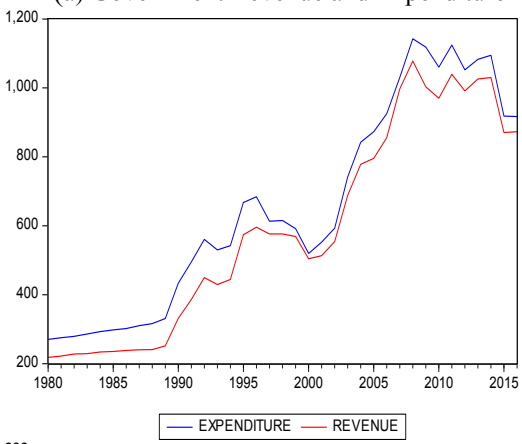
Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

Figure 10 (c) indicates that Italy has maintained a budget deficit prior and post the 2008 financial crisis. This deficit has significantly widened after the crisis. While government expenditures and revenues have been moving together since 1980, they started drifting apart right after the 2008 financial crisis (Figure 10 (a)). This translated into a sever deterioration of Italy's total public debt increasing from USD 1.4 trillion in 2003 to about USD 2.75 trillion in 2015 (Figure 10 (e)).

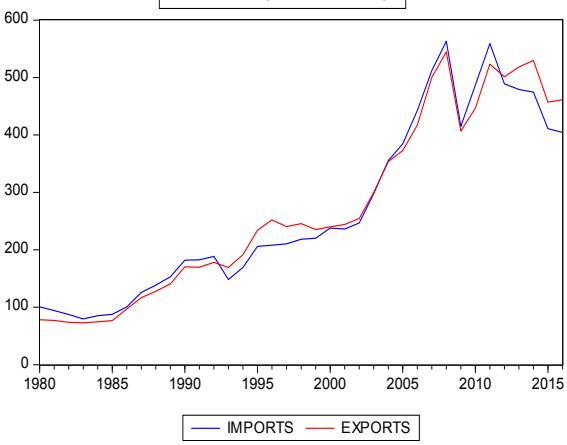
Figure 10 (b) and Figure 10 (c) also indicate that Italy's current account balance has managed to move into consecutive deficits post 2008 financial crisis due to a decrease in exports emanating from the worldwide recession, and an increase in imports resulting from higher domestic demand. Moreover, Italy's budget deficit reached a low of USD 120 billion during the 2008 financial crisis. Finally, Italy's banking system has continued to struggle due to the significant accumulation of bad debt/loans. Unless addressed swiftly through the introduction of various financial corrective measures, these financial difficulties could translate into a EU banking crisis with far more devastating consequences on the EU than the Greek debt crisis of 2011.

Figure 10. Macroeconomic Developments in Italy: 1980–2016 (in USD billion)

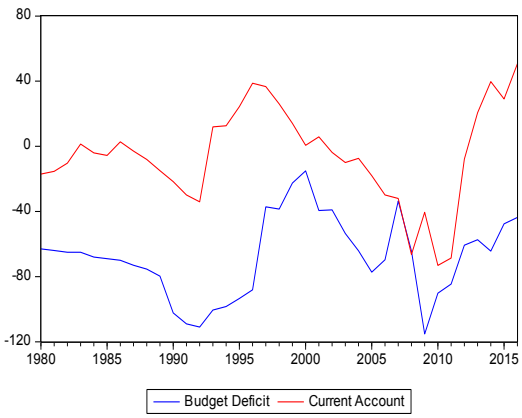
(a) Government Revenue and Expenditure



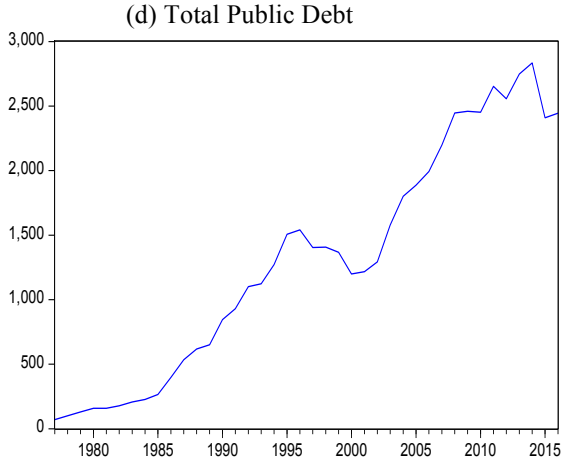
(b) Imports and Exports



(c) Budget Deficit and Current Account



(d) Total Public Debt



Sources: International Monetary Fund's International Financial Statistics and World Economic Outlook and from the World Banks's Government Finance Statistics.

4. Empirical Methodology and Results

Empirical studies on the sustainability of macroeconomic policies are numerous and have gained extreme importance after the latest financial and debt crises. We study next the EU and MED time series properties of the fiscal, as well as, balance of payments component variables following a major strand of the empirical literature. This approach has proven to be elegant and robust as it uses actual fiscal and macroeconomic variables and shy away from

calibration empirical modelling. Two empirical frameworks have been used to test for fiscal sustainability. The first rests mainly on testing the stationarity of the various macroeconomic variables, while the second employs cointegration and granger causality time series techniques and explores the existence of a long-run and short run equilibrium relationship between the macroeconomic variables of interest.

Under the first framework, if the budget or current account deficit series are non-stationarity, then it means that they are growing without bound over time, which means that subsequent debt will also grow without bound rendering fiscal policy unsustainable. This will also violate the Present Value Constraint and the No-Ponzi-Game constraints in equations (3) and (15). A stationary deficit means that the series is reverting to a certain mean overtime being in general close zero, i.e., the budget is balanced. If that were the case, then obviously fiscal policy and debt would be sustainable, since deficits will be under control. In the second framework, cointegration tests are used to explore whether there is a long-run relationship between government revenues and expenses, exports and imports, and exports and foreign debt. If such relationships exist, then this means that the respective government is not spending without bound and is taking into account the amount of revenues it is generating from exports and taxes. Subsequently, it will not have to resort to deficit financing to cover its expenses, and debt whether external of internal would be sustainable and will not grow without bound.

Empirical studies on developed economies are numerous and were initiated by the paper of Hamilton and Flavin (1986). Using yearly data for the US, covering the period 1962-1984, they tested the validity of the PVC, or equivalently the NPG condition, or the budget constraint.[9] In their study, if the government deficit and debt series are stationary then debt is sustainable which was the case for the US sample used. Using also yearly data for the US economy over a larger sample covering respectively the periods: 1890-1983 and 1960-1984, Trehan and Walsh (1988, 1991) studied the stationary of the public deficit and debt, and concluded that since they were stationary for both sample periods, then debt is sustainable. Running the same empirical tests, Kremers (1988) used a different sample period: 1920-1985, and found debt to be sustainable until 1981.[10]

Within the same framework other researchers conducted stationarity tests on other countries to see whether debt is sustainable. For instance, Smith and Zin (1991) used Canadian monthly data for the period 1946-1984, and looked at the stationarity of the public debt and deficits and found that debt was not sustainable. For India, and using the same tests and the sample period 1970-1988 but yearly data, Buiter and Patel (1992) found that public debt in India was not sustainable. Using monthly data for Italy and the period 1979-1991, Baglioni and Cherubini (1993) found that debt is not sustainable. Caporal (1995) using annual data on some EU countries over the period 1960-1991 found that the Italian, Greek, Danish and German debts were not sustainable. Makrydakis (1999) using annual data for Greece over the period 1958-1995 also found that debt is not sustainable.

Other empirical studies have used cointegration techniques to test whether debt is sustainable. These cointegration techniques were used to test whether a long run relationship exists between government revenues and expenditures, and between exports and imports. If such relationship exits, then one can conclude that debt is sustainable. For the US, Tanner and Liu (1993) and Haug (1995) found that the US debt is sustainable. Using Quarterly US Data

[9] Agenor and Montiel (1996) argued that the government is solvent if the present value of the future resources available to it for debt service at least equal to the face value of its initial debt stock (p.123). Thus, satisfying the present value budget constraint, implying that the government is solvent.

[10] However, Wilcox (1989) found that debt was not sustainable over the 1960-1984 sample period.

for the period 1947-1992, Quintos (1995) found that US debt was sustainable until 1980. Using EU data form 1692-1992, Ahmed and Rogers (1995) found that debt is sustainable. Payne (1997) used annual data for some G7 countries and found that debt is sustainable for Germany. Crowder (1997) used Quarterly US data and found debt to be sustainable until 1982. Athanasios and Sidiropoulos (1999) also used EU data over the period 1961-1994 and found debt to be unsustainable for Spain, Belgium, Greek, Italy and Portugal.

More recently, Neaime (2010, 2012a) analyzed the conduct of fiscal and financial policies and studied the sustainability of public debt in the Middle East and North Africa (MENA) in the post US financial crisis period. Using time series econometric tests and the PVC model, the empirical results show strong evidence of sustainability of fiscal policies in Tunisia given the country's fiscal discipline. The weak sustainability in Egypt is explained by the successful privatization plan introduced during the 1990s. Morocco's mixed results are explained by the recently introduced fiscal recovery reforms. The unsustainable debt and fiscal policies for Jordan and Turkey were explained by the size of the government causing major fiscal imbalances for Jordan's economy, and by the weakness of the financial and banking sectors in Turkey.

While the empirical literature is rich in studies using simple unit root and cointegration tests, this study contributes to that literature by using and for the first time, the recently developed panel unit root, granger causality, and conintegration tests. The panel econometric tests to be carried out rest on the two frameworks advanced in the literature, that is panel stationarity, Granger causality and cointegration tests. We will estimate two different panels, one for the EU's countries and one for the MPs. We use yearly data covering the period 1977-2016 for the EU's countries of Greece, Italy, Portugal, Ireland, and Spain and the MPs of Egypt, Morocco, Tunisia, Jordan and Lebanon.

The panel data VAR methodology combines the traditional VAR approach, which treats all variables in the system as endogenous, with the panel-data approach allowing for unobserved individual heterogeneity. In its general form, our model can be written as follows:

$$z_{it} = \Gamma_0 + \Gamma_1 z_{it-1} + f_i + d_t + e_{it}. \quad (20)$$

Where z_{it} is a vector of seven key macroeconomic variables: budget balance, government expenditures, government revenues, exports, imports, current account balance, and external foreign debt. The advantage of the panel VAR is the same as the advantage of any panel approach in allowing for explicit inclusion of a fixed effect in the model, denoted f_i, which captures all unobservable country specific time-invariant factors. This is important for our purposes as inclusion of these fixed effects allows each country to have a country specific level of each of the factors in the model, and, in addition, to capture other time-invariant factors, such as country size. Finally, e_{it} is the usual error term.

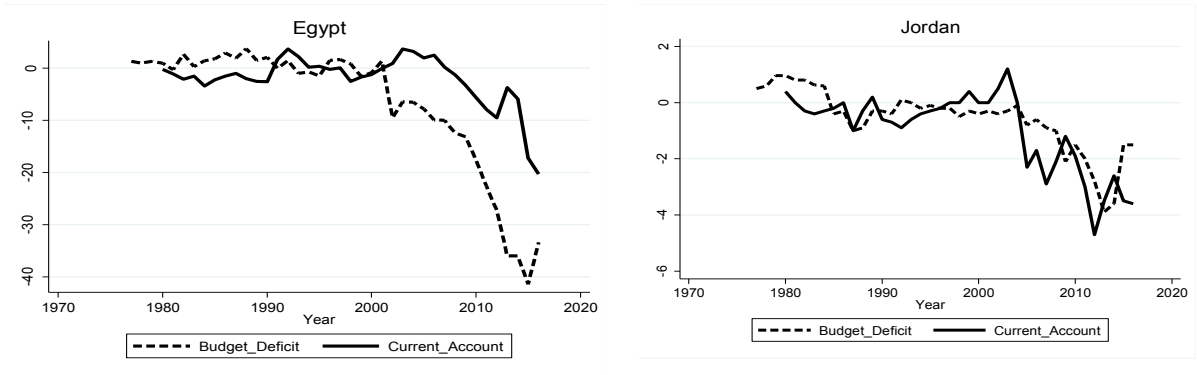
The analytical structure behind our empirical modeling procedure first starts with implementing panel unit root tests to check for the existence of unit roots and spurious regressions. Before performing the causality and cointegration tests, it is essential to check for the stationarity of the respective series used in order to obtain unbiased estimations from the Granger causality tests. There exist numerous panel root tests to examine the stationarity properties of a panel data. In this study, we use the Im et al. (IPS-W statistic test, 2003) to check for the existence of unit roots in order to determine whether the series are stationary or not. Similar to panel unit root tests, cointegration tests for panel time series data are of higher power especially with relatively large number of observations. This study employs Pedroni's (1999) panel cointegration tests. Therefore, if in each country the series are individually non-stationary but together, generally speaking, are cointegrated, we know from the Granger

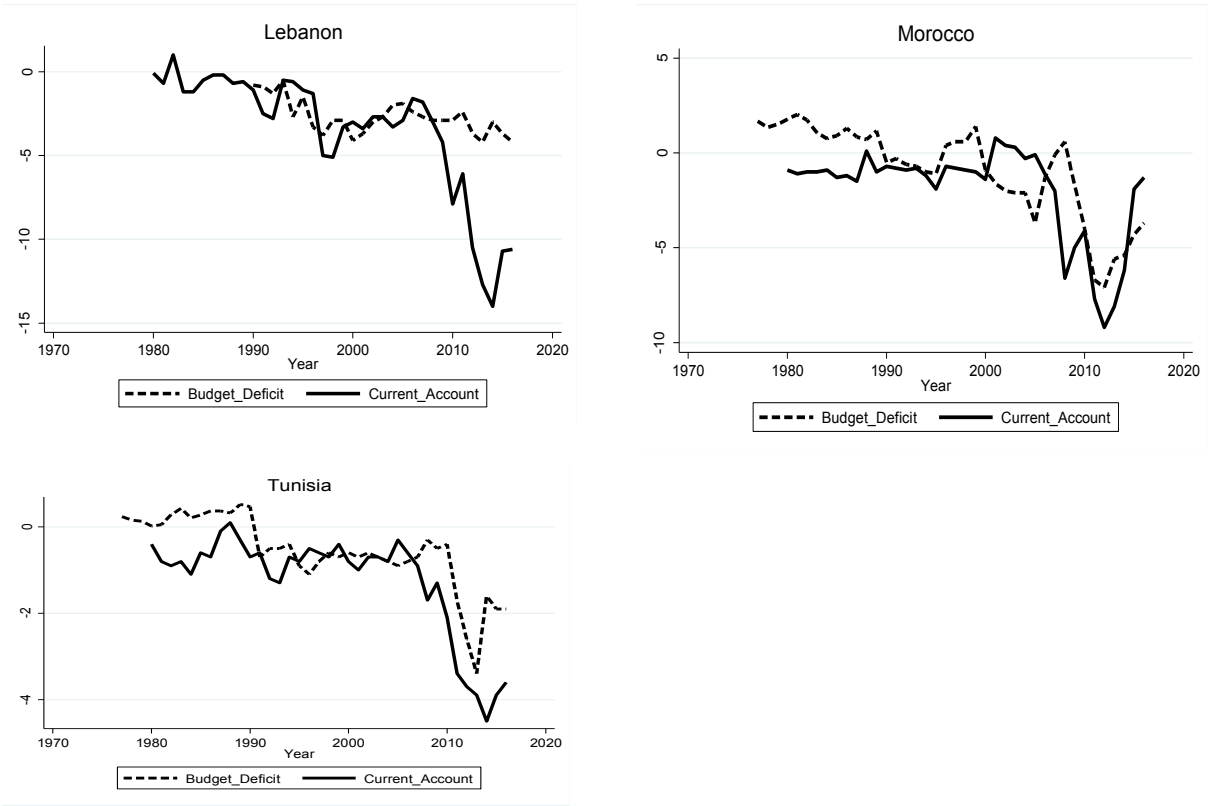
representation theorem that these series can be represented in the form of a vector error correction model (VECM). For the stationary series we will undertake a series of panel granger causality tests using a panel vector autoregressive model (VAR). Finally, panel granger causality tests are used to explore the Twin Deficits Hypothesis between the EU and the MPs budget and current account deficits and the direction of causality.

4.1 Data and Sample

Our yearly dataset is retrieved from the IMF's World Economic Outlook and the World Bank Global Development database covering the period 1977-2016. The empirical analysis will first focus on the causality between two variables: annual current account balance and the central government's structural balance (both measured in billion USD) for five MED countries (Egypt, Jordan, Lebanon, Tunisia, and Morocco) and five EU countries (Greece, Ireland, Portugal, Spain, and Italy). As indicated in Kim and Roubini (2008), trade and public balances are jointly impacted by the business cycle. For instance, during recessions the government balance deteriorates (due to the impact of automatic stabilizers) while the trade balance improves due to lower demand for imports. In order to control for this endogeneity issue we also include annual GDP growth in our models. We end up with an unbalanced panel ranging from 1978 to 2016. The data is shown in Figure 11 and 12 and highlights a positive long run correlation between current account and the structural balance in all individual countries.

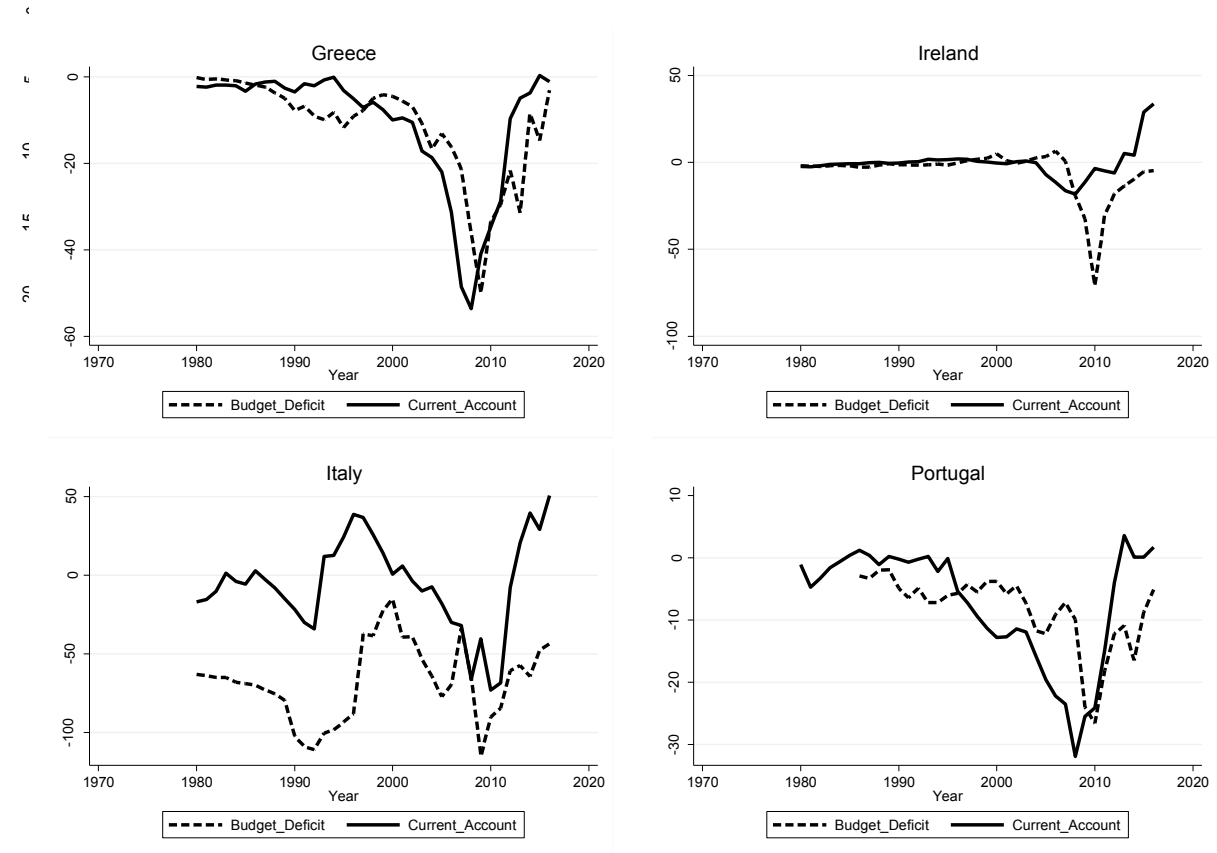
Figure 11. Twin Deficits – MED Countries

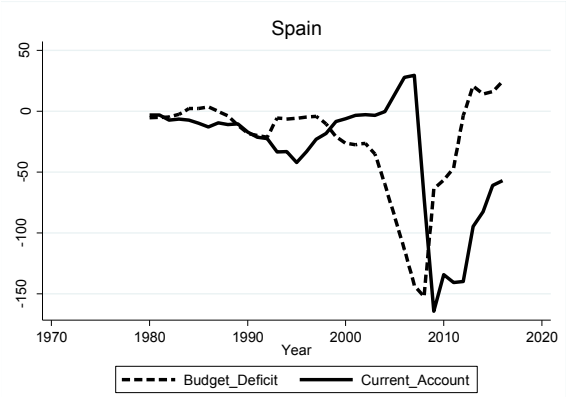




Source : World Bank's Global Development Database, and IMF World Economic Outlook database. Notes: The two series are the budget balance and the current account measured in USD billion

Figure 12. Twin Deficits – EU Countries





Source : World Bank's Global Development Database, and IMF World Economic Outlook database.
Notes: The two series are the budget balance and the current account measured in USD billion

4.2 Panel Unit Root Analysis

We begin the analysis by investigating the panel unit root properties of the respective macroeconomic series. We use the unit root test of Im-Pesaran and Shin (2003) which is adequate for unbalanced panel data and which allows for cross sectional heterogeneity in the presence of unit roots. Following Hurlin and Mignon (2006), the test can be outlined as follows. Consider an ADF-type model for each individual in the panel:

$$\Delta y_{i,t} = \alpha_i + p_i y_{i,t-1} + \sum_{j=1}^{p} \beta_{i,j} \Delta y_{i,t-j} + \varepsilon_{i,t,} \tag{21}$$

where the individual effect is defined as $\alpha_i = -p_i \gamma_i$with $\gamma_i \epsilon R$ and $\varepsilon_{it}$is $N.id(0, \sigma_i^2)$. The test thus allows for different orders of autocorrelation for the different individuals in the panel. A standardized test statistic $Z_{tbar}(p, \beta)$ is then developed based on the average of the individual ADF statistics:

$$tbar = \frac{1}{N} \sum_{i=1}^{N} t_{iT}(p_i, \beta_i), \tag{22}$$

with $t_{iT(p_i,\beta_i)}$the individual test statistic for the null hypothesis $H_{0,i}: p_i = 0$, for a given lag p and a vector of individual ADF parameters $\beta_i = (\beta_{i,1}, \dots, \beta_{i,pt})'$. Selecting the number of mags according to AIC/BIC criteria, as shown in Table 3, we reject the null hypothesis of panel unit root for all series in both panels, except for the current account variable in the MED panel - which is integrated of order one. We therefore first-differentiate all series prior to proceeding to the panel VAR estimation.

Table 3. Im-Pesaran and Shin (2003) Panel Unit Root Tests

Panel EU countries		Level	First Difference	
Variable	Constant	Constant + Trend	Constant	Constant + Trend
Current account	0.014**	0.0496**	0.000***	0.000***
Government balance	0.0023**	0.0390**	0.000***	0.000***
Panel MED countries				
Variable				
Current account	0.6859	0.9016	0.000***	-0.000***
Government balance	0.0230**	0.0167**	0.000***	0.0015***

Source: Authors' estimates.
Note : **, *** indicates rejection of the null hypothesis of a unit root at 1% and 5%, levels of significance.

4.3 Panel VAR Modelling

Having hence described our series, we adopt a panel structural VAR modeling approach to investigate the dynamic relationship between the current account and the government balance in our sample. We adopt a panel structural VAR modelling approach in order to analyze the twin deficit hypothesis in two sub samples: the MED countries and the EU countries. Using a VAR specification is appropriate as this method permits to estimate the dynamic relationship between current account and the government balance. Panel data modelling brings out individual heterogeneity and permits to identify effects not easily detected with time series or cross-sectional data. Our approach can be outlined as follows. Consider the following structural VAR model:

$$\begin{cases} X_{it} = A^{*}(L)X_{i,t-j} + \Gamma^{-1}\varepsilon_{i,t} \\ \varepsilon_{i,t} = v_i + v_t + v_{it} \end{cases} \quad (24)$$

Where X_{it} is a vector of stationary variables, L is the lag operator and A*(L) is a transformed matrix of coefficients such as $A^{*}(L) = \Gamma^{-1}A(L)$ where Γ is the matrix of contemporaneous parameters and A(L) the initial matrix of VAR parameters. Fixed time and individual effects (v_i and v_t) are included in the model to accommodate for unobserved individual heterogeneity. Errors v_{it} have zero mean ($E(v_{it}) = 0$). The variance-covariance matrix of reduced form shocks $E(v_{it}, v'_{it}) = \Omega$ is real, symmetrical and positive definite. To derive impulse response from the model, this matrix is rewritten as

$$\Omega = KDK', \quad (25)$$

where D is a diagonal matrix and K is an n x n invertible matrix which has to be estimated to identify the structural shocks.. Letting $u_{it} = K^{-1}v_{it}$ be a vector of orthogonal residuals with $E(\mu_{it}, \mu'_{it}) = E(K^{-1}v_{it}, v'_{it}K^{-1\prime}) = K^{-1}(KDK')K^{-1\prime} = D$, the moving average representation is:

$$X_{it} = \sum_{i=1}\sum_{h\geq 0}\phi_h KK^{-1}v_{i,t-h} = \sum_{i=1}\sum_{h\geq 0}\Phi_h\mu_{i,t-h}\, with\, \Phi_h = \phi_h K\,. \quad (26)$$

Since the moving average form is obtained by inverting the VAR model, elements of Φ_h are a function of the initial VAR parameters. Orthogonal responses of X_{it} variables to innovations $\mu_{is}, s \leq t$ can be derived via dynamic multiplicators, $\frac{\delta X_{it}}{\delta \mu_{is}} = \Phi_{t-s}$ and structural error response functions are then $\forall h \geq 0 \rightarrow \Phi_h$.

Our model includes three variables: annual percent change in the current account, annual percent change in the government balance, and annual GDP growth rate. From a modeling point of view, this implies identifying the n^2 elements of the K matrix. In our case $n(n+1)/2$ (i.e. 6) orthogonality constraints are already set since K is a symmetrical matrix. We give K a lower triangular structure and use a Generalized Impulse Response Functions in order to eliminate the compositional effects of the Choleski decomposition. Error margins are computed by bootstrap with a 95 % confidence interval.

The presence of lagged endogenous variable and individual fixed effects biases the OLS and Within-Group Estimators. Parameters of the SVAR model are thus estimated via a system GMM. This estimation is also recommended for panel VARs where the cross sectional dimension is larger than the time dimension. We first apply a Helmert transformation to our dataset by computing weighted deviations from forward means. One key feature of this transformation is that weights c_t preserve the variance of the dataset. In addition, the absence

of serial correlation in the error terms is preserved while transformed error terms become orthogonal to the untransformed variables, which can then be used as instruments. Our estimations are using lags 1 to 4. We conduct two separate analyses: one for the Eurozone countries sub-sample and one for the MED sub-sample.

Beginning with the MED sample, we find that the current account Granger causes the public balance; while the public balance does not Granger-causes the current account (Table 6). The causality relationship between the current account and the budget balance appears robustly positive as shown by the static SGMM estimation (Table 5) and the impulse response function (Figure 13). This indicates that efforts geared at improving the government balance in order to restore the current account are not effective; however, an increase in the current account generates a short run improvement of the government balance to a proportion that go to 4.34% of the explained variance of the budget balance (Table 7).

Table 5. SGMM PVAR Estimations - MED Countries

	(1)	(2)	(3)
VARIABLES	Current Account	Budget Balance	GDP growth
L. Current Account	0.149	0.239***	-0.126
	(0.118)	(0.0828)	(0.127)
L. Budget Balance	0.102	-0.0458	0.330**
	(0.118)	(0.140)	(0.150)
L.GDP growth	0.0163	0.0293	0.0869
	(0.0127)	(0.0276)	(0.0666)
Observations	155	155	155

Source: Authors' estimates. Standard errors are in parentheses.
Note: **, *** indicate significance at the 5% and 1% levels, respectively. The p-value of Hansen's J statistic is 0.427.

Table 6. Panel Granger Causality Tests – MED Countries

Equation	chi2	df	Prob>chi2
Current Account			
Budget Balance	0.750	1	0.386
GDP growth	1.655	1	0.198
ALL	3.003	2	0.223
Budget Balance			
Current Account	8.347	1	0.004***
GDP growth	1.125	1	0.289
ALL	8.957	2	0.011**
GDP growth			
Current Account	0.994	1	0.319
Budget Balance	4.828	1	0.028**
ALL	7.052	2	0.029**

Source: Authors' estimates. Note: **, *** indicate significance at the 5% and 1% levels, respectively.

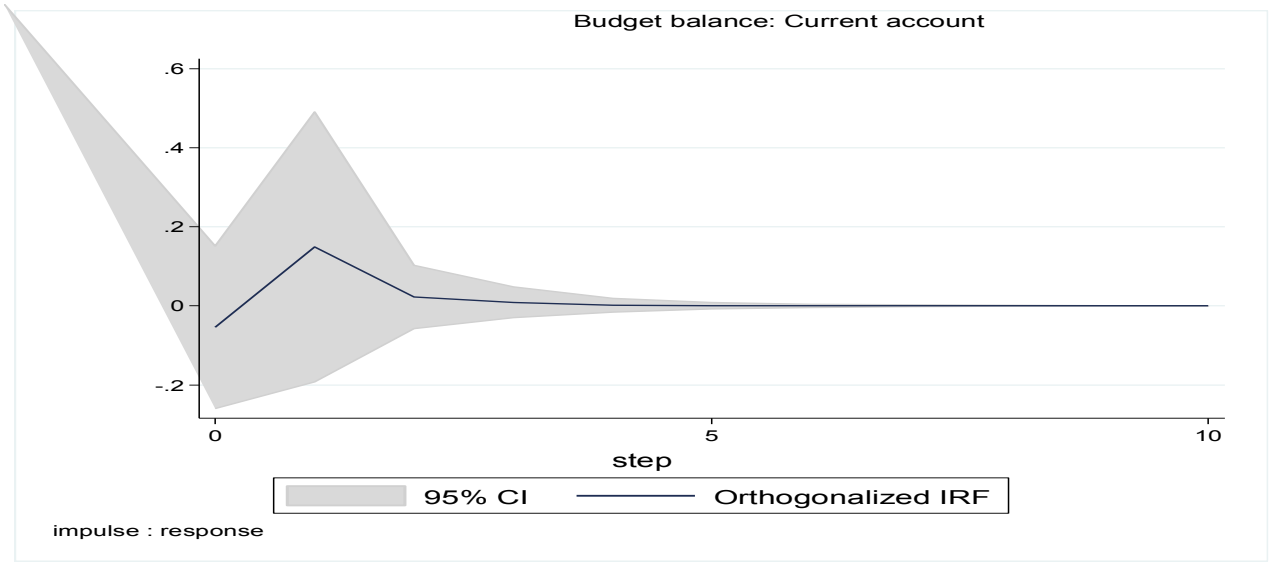
Table 7. Variance Decomposition Analysis – MED Sample

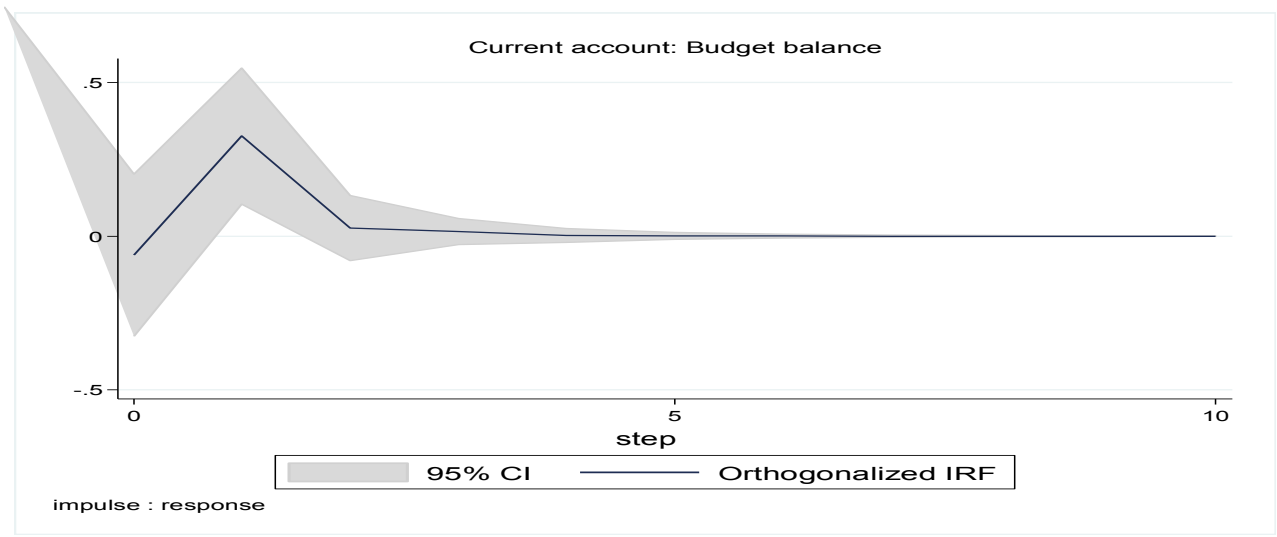
Response variable and forecast horizon

Current account	Current account	Budget balance	GDP_growth
0	0	0	0
1	1	0	0
2	.9835526	.014786	.0016614
3	.982883	.01517	.001947
4	.9828093	.0152242	.0019665
5	.9828054	.0152267	.0019679
6	.982805	.0152269	.001968
7	.982805	.0152269	.001968
8	.982805	.0152269	.001968
9	.982805	.0152269	.001968
10	.982805	.0152269	.001968
Budget balance			
0	0	0	0
1	.0016163	.9983837	0
2	.0431994	.9528351	.0039655
3	.0433862	.9525345	.0040793
4	.0434679	.9524376	.0040946
5	.04347	.9524346	.0040953
6	.0434703	.9524344	.0040954
7	.0434703	.9524344	.0040954
8	.0434703	.9524344	.0040954
9	.0434703	.9524344	.0040954
10	.0434703	.9524344	.0040954
GDP_growth			
0	0	0	0
1	.0000129	.0226231	.9773639
2	.0029861	.0469188	.9500951
3	.0033365	.0468983	.9497653
4	.0033401	.0469192	.9497407
5	.0033413	.0469193	.9497393
6	.0033414	.0469193	.9497393
7	.0033414	.0469193	.9497393
8	.0033414	.0469193	.9497393
9	.0033414	.0469193	.9497393
10	.0033414	.0469193	.9497393

Source: Authors' estimates.

Figure 13. Impulse Response Functions, MED Sample





Source: Authors' estimates.

Turning to the EU sample, we find that the budget balance Granger-causes the current account deficit account, while the opposite does not hold (Table 9). In addition, it appears that an increase in the budget balance leads to an improvement of the current account, as shown by the static SGMM estimations (Table 8) and the impulse response functions (Figure 14). This indicates that efforts geared at improving the current account balance do not generate an improvement in the government balance (the dynamic turning out to be even negative in the short run, as shown by Figure 14). On the other hand, improving the government balance tends to improve the current account: a positive shock in the budget balance explains up to 5.33% of the variance error forecast of the current account.

Table 8. GMM PVAR Estimations – EU Countries

	(1)	(2)	(3)
VARIABLES	Current Account	Budget Balance	GDP growth
L. Current Account	0.185**	-0.0280	0.0113
	(0.0858)	(0.0788)	(0.00839)
L. Budget Balance	0.224***	0.174*	-0.00176
	(0.0781)	(0.0959)	(0.00906)
L. GDP_growth	-0.408**	-0.644**	0.680***

	(0.193)	(0.267)	(0.0706)
Observations	159	159	159

Source: Authors' estimates. Standard errors in parentheses.
Notes: **, *** indicate significance at the 5% and 1% levels, respectively.
The p-value of Hansen's J statistic is 0.427.

Table 9. Panel Granger Causality Tests– EU Countries

Equation	chi2	df	Prob>chi2
Current Account			
Budget Balance	8.228	1	0.004***
GDP growth	4.441	1	0.035**
ALL	13.295	2	0.001***
Budget Balance			
Current Account	0.126	1	0.722
GDP growth	5.798	1	0.016**
ALL	5.874	2	0.053
GDP growth			
Current Account	1.808	1	0.177
Budget Balance	0.038	1	0.846
ALL	1.808	2	0.405

Source: Authors' estimates.
Notes: **, *** indicate significance at the 5% and 1% levels, respectively.

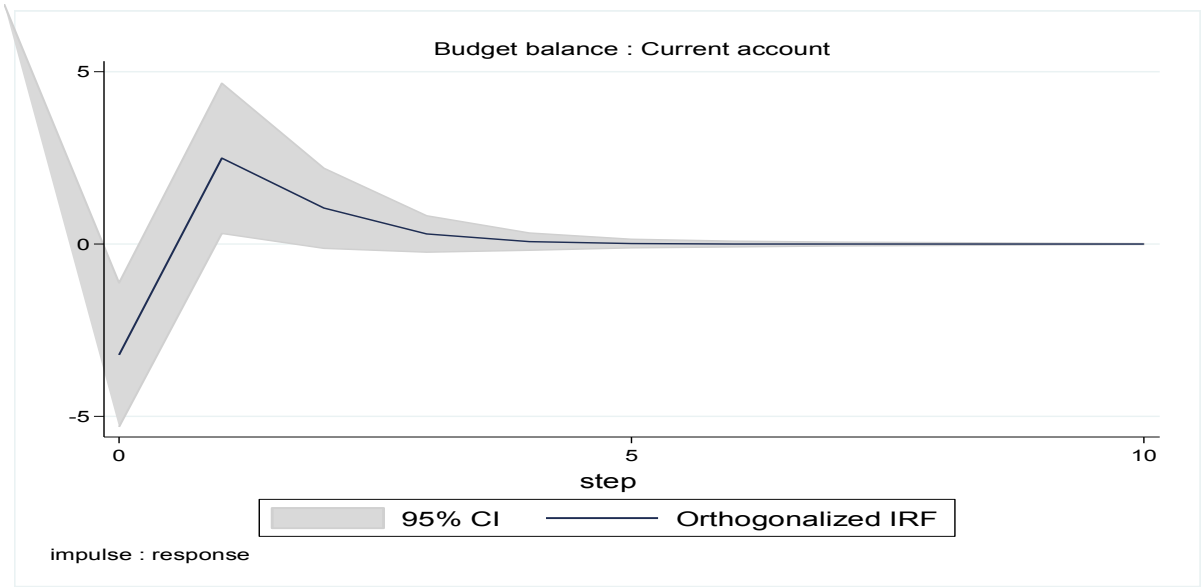
Table 10. Variance Decomposition Analysis –EU Countries

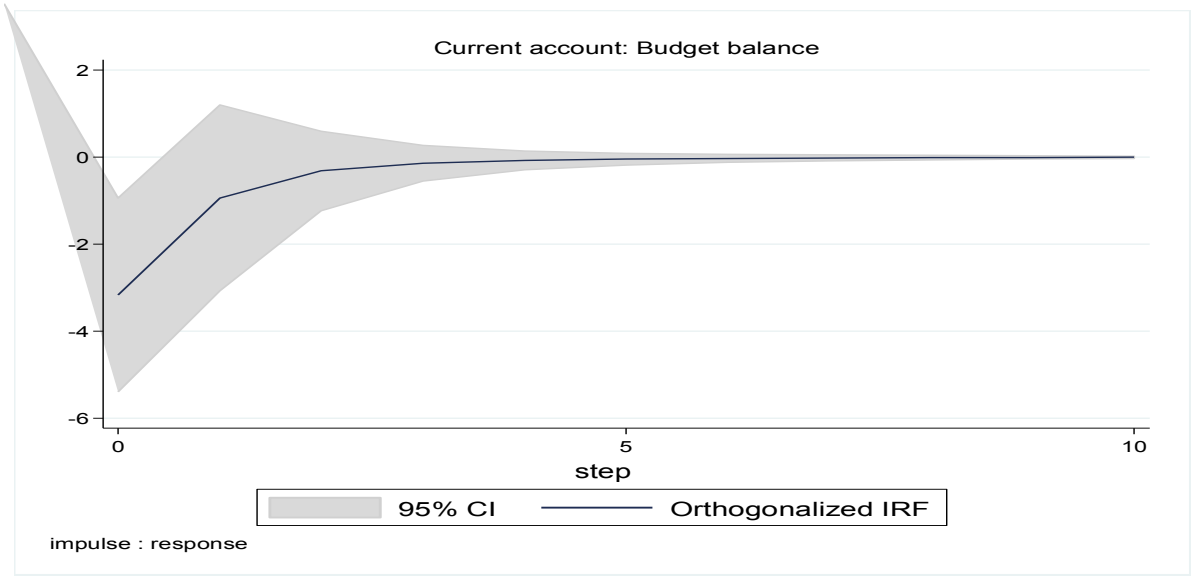
Response variable and forecast horizon			
Current account	Current account	Budget balance	GDP_growth
0	0	0	0
1	1	0	0
2	.9512712	.0447271	.0040017
3	.9397278	.0504443	.0098279
4	.9357163	.0507137	.0135699
5	.9339126	.050646	.0154415
6	.9330935	.0506033	.0163032
7	.932727	.0505834	.0166896
8	.932564	.0505746	.0168614
9	.9324916	.0505706	.0169377
10	.9324595	.0505689	.0169716
Budget balance			
0	0	0	0
1	.0521039	.9478961	0

	2	.0537135	.9357911	.0104955
	3	.0536269	.9286981	.0176751
	4	.0534936	.92538	.0211264
	5	.0534249	.9239004	.0226747
	6	.0533934	.9232455	.0233611
	7	.0533794	.9229556	.0236651
	8	.0533731	.922827	.0237998
	9	.0533704	.9227701	.0238596
	10	.0533691	.9227448	.0238861
GDP_growth				
	0	0	0	0
	1	.001667	.0030894	.9952436
	2	.0025101	.003701	.9937889
	3	.0031873	.0034574	.9933553
	4	.0034772	.0033057	.9932171
	5	.0035978	.0032361	.993166
	6	.0036494	.0032054	.9931452
	7	.0036718	.0031919	.9931363
	8	.0036816	.0031859	.9931325
	9	.003686	.0031832	.9931307
	10	.0036879	.003182	.99313

Source: Authors' estimates.

Figure 14. Impulse Response Functions – EU Countries





Source: Authors' estimates.

These results lead us to accept the Twin Deficit Hypothesis in both the EU and MED samples. From a macroeconomic policy perspective, we however reject the relevance of current account targeting (when governments consider that running a fiscal surplus is a way to reduce the current account deficit) in EU countries, where the causality appears to run from the public balance to the trade balance. Restoring the public balance could thus be seen as a policy priority in these countries On the other hand, the relationship appears to run in the opposite direction for MED countries, where the public balance is driven by trade performance. These results show that a 'one size fits all' approach to the Twin Deficit problem is not optimal; a result which appears particularly relevant given the adverse social consequences of restrictive fiscal policies already discussed in the introduction.

4.4 Sustainability of MED and EU Fiscal Policies

Next we explore the sustainability of the MED and EU's macroeconomic policies. For this purpose, we perform panel unit and conintegration tests on the following macroeconomic variables: Exports and imports, government revenues and expenditures, current account and budget deficits, foreign and total public debt. As argued above, if the budget or current account deficit series are non-stationarity, then it means that they are growing without bound over time, which means that subsequent debt will also grow without bound rendering fiscal policy unsustainable. This will also violate the Present Value Constraint and the No-Ponzi-Game constraints. A stationary deficit means that the series is reverting to a certain mean overtime being in general close to zero; indicating a balanced budget. If that were the case, then obviously fiscal policy and debt would be sustainable, since deficits will be under control.

We also use panel cointegration tests to explore whether there exist a long-run relationship between government revenues and expenses, and exports and imports. If such relationship exists, this means that the respective government is not spending without bound and is taking into account the amount of revenues it is generating from taxes and exports. Subsequently, it will not have to resort to deficit financing to cover its expenses, and debt would be sustainable and will not grow without bound.

Table 11. Im-Pesaran and Shin's (2003) Panel Unit Root Tests: MED Countries

	Level		First Difference	
Variable	**Constant**	**Constant + Trend**	**Constant**	**Constant + Trend**
Expenditures	3.15	1.11	-5.32**	-4.36**
Revenues	4.09	1.61	-6.15**	-5.56**
Exports	3.77	1.51	-6.36**	-5.35**
Imports	3.84	1.62	-6.29**	-5.45**
Budget Deficit	-0.63	-2.0**	-5.67**	-3.67**
Current Account	1.6	1.01	-7.28**	-6.46**
Foreign Debt	1.94	0.24	-5.45**	-4.64**
Total Public Debt	7.55	4.00	-3.87**	-4.84**

Source: Authors' estimates.
Note: *, ** denotes rejection of the null hypothesis of a unit root at 1% and 5% levels of significance respectively.

Table 11 indicates that MED exports and imports, government revenues and expenditures, current account and budget deficits and foreign and total public debts are all non-stationary I(1) series pointing to the non-sustainability of fiscal and macroeconomic policies in all five MED countries under investigation.

Table 12. Pedroni's (1999) Cointegration Tests: MED Exports and Imports

	Constant	Constant + Trend
Panel v-Statistic	4.02**	1.60
Panel p-Statistic	-0.30	1.27
Panel t-Statistics (non-Parametric)	0.98	2.65
Panel t-Statistics (Parametric)	2.68	4.78
Group p-Satistics	-0.10	0.74
Group t-Satistics (non-Parametric)	0.08	0.92
Group t-Satistics (Parametric)	1.16	2.21

Source: Authors' estimates.
Notes: All statistics are from Pedroni's procedure (1999) where the adjusted values can be compared to the N (0,1) distribution. A *,** indicates rejection of the null hypothesis of no-co-integration at 5% and 1%, levels of significance respectively.

The MED panel cointegration test results are laid down in Tables 12, 13 and 14. The empirical results point to the existence of a long-run relationship between government revenues and expenditures (Table 13), but no long-run relationship between exports and imports (Table 12) and exports and foreign debt (Table 14), reinforcing the above unit root test results. It is, therefore, clear that after the recent financial and debt crises the respective MED governments have started spending without bound and are no longer taking into account the amount of revenues generated from taxes and exports. They subsequently had to resort to deficit financing to cover current expenditures, and foreign and total public debts have become unsustainable and have started to grow without bound.

Table 13. Pedroni's (1999) Cointegration Tests: MED Government Expenditure and Revenues.

	Constant	Constant + Trend
Panel v-Statistic	2.25*	-0.23
Panel p-Statistic	-2.8*	-0.95
Panel t-Statistics (non-Parametric)	-1.96*	-0.82
Panel t-Statistics (Parametric)	-1.88*	-0.95
Group p-Satistics	-1.64*	0.51
Group t-Satistics (non-Parametric)	-2.19*	-0.44
Group t-Satistics (Parametric)	-2.90**	-2.61

Source: Authors' estimates.
Note: All statistics are from Pedroni's procedure (1999) where the adjusted values can be compared to the N(0,1) distribution. A *,** indicates rejection of the null hypothesis of no-co-integration at 5% and 1%, levels of significance respectively.

Table 14. Pedroni's (1999) Cointegration Tests: MED Exports and Foreign Debt.

	Constant	Constant + Trend
Panel v-Statistic	-1.40	-0.70
Panel p-Statistic	1.53	0.91
Panel t-Statistics (non-Parametric)	1.80	0.67
Panel t-Statistics (Parametric)	2.56	1.91
Group p-Satistics	1.38	0.95
Group t-Satistics (non-Parametric)	1.79	0.49
Group t-Satistics (Parametric)	2.50	1.84

Source: Authors' estimates.
Note: All statistics are from Pedroni's procedure (1999) where the adjusted values can be compared to the N(0,1) distribution. A *,** indicates rejection of the null hypothesis of no-co-integration at 1% and 5%, levels of significance respectively.

Table 15. Im-Pesaran and Shin (2003) Panel Unit Root Tests: EU Countries.

	Level		First Difference	
Variable	**Constant**	**Constant + Trend**	**Constant**	**Constant + Trend**
Expenditures	0.52	1.59	-3.95**	-2.57**
Revenues	0.53	1.027	-4.78**	-3.50**
Exports	-0.55	2.58	-4.26**	-3.41**
Imports	0.78	1.65	-6.21**	-5.22**
Budget Deficit	-1.89*	-0.61	-6.92**	-5.5**
Total Public Debt	2.98	0.722	-3.22**	-1.65*
Current Account	-2.33**	-0.72	-6.31**	-4.95**

Source: Authors' estimates.
Note: *, ** denotes rejection of the null hypothesis of a unit root at 1% and 5% levels of significance respectively.

Table 15 indicates that EU's exports and imports, government revenues and expenditures, current account and budget deficits, and total public debt are all non-stationary I(1) series pointing to the non-sustainability of fiscal and macroeconomic policies in all five EU countries under investigation. However, and under the assumption of a constant and no time trend the budget balance and the current account appear to be stationary.

Table 16. Pedroni's (1999) Cointegration Tests: EU Government Expenditure and Government Revenues

	Constant	Constant + Trend
Panel v-Statistic	2.30*	0.85
Panel p-Statistic	-1.32	0.16
Panel t-Statistics (non-Parametric)	-1.14	-0.22
Panel t-Statistics (Parametric)	-2.69**	-2.69*
Group p-Satistics	-1.28	0.29
Group t-Satistics (non-Parametric)	-2.44**	-1.35*
Group t-Satistics (Parametric)	-3.77**	-3.45**

Source: Authors' estimates.
Note: All statistics are from Pedroni's procedure (1999) where the adjusted values can be compared to the N (0,1) distribution. A *,** indicates rejection of the null hypothesis of no-co-integration at 5% and 1%, levels of significance respectively

The EU panel cointegration tests are shown in Tables 16 and 17. Four out of Pedroni's seven cointegration tests outlined in Table 16 reject the null hypothesis of no cointegration between the EU's government expenditures and revenues pointing to the existence of a long-run relationship between the two respective series. It is, therefore, clear that at least and over the period under consideration the EU countries under investigation have tried to keep fiscal policies under control despite the fact that after the recent financial and debt crises the respective EU governments have started spending without bound and are no longer taking into account the amount of revenues generated from taxes when deciding upon permissible fiscal spending limits. Those countries, subsequently, had to resort to deficit financing to cover current expenditures. Thus, public debt may become unsustainable and may start to grow without bound in the future if fiscal adjustment and austerity measures are not swiftly introduced. That explains why the governments of Greece, Portugal, Spain, Italy and Ireland have all resorted to strict austerity measures for the purpose of debt containment and fiscal sustainability, despite the recessionary environment in the EU countries and the inadequate timing for the introduction of those measures.

Table 17. Pedroni's (1999) Cointegration Tests: EU Exports and Imports

	Constant	Constant + Trend
Panel v-Statistic	3.26**	0.82
Panel p-Statistic	-1.88*	0.28
Panel t-Statistics (non-Parametric)	-1.25	0.51
Panel t-Statistics (Parametric)	-1.50	0.04*
Group p-Satistics	-0.39	1.24
Group t-Satistics (non-Parametric)	-0.39	1.25
Group t-Satistics (Parametric)	-0.97	0.54

Source: Authors' estimates.
Note: All statistics are from Pedroni's procedure (1999) where the adjusted values can be compared to the N (0,1) distribution. A *,** indicates rejection of the null hypothesis of no-co-integration at 5% and 1%, levels of significance respectively.

Two out of Pedroni's seven cointegration tests outlined in Table 17 reject the null hypothesis of no cointegration between the EU's exports and imports pointing to the existence of a long-run relationship between the two respective series. It is, therefore, clear that at least and over the period under consideration the EU countries under investigation could not keep external sector's policies under control and the recent financial and debt crises have worsen the current account deficits even further. Since Greece, Portugal, Spain, Italy, and Ireland became members of the EU, they started losing competitiveness against Germany. Exports started decreasing at alarming rates and imports increasing with trade and current account deficits registered mainly with Germany. Relating these results to our earlier empirical results that the budget deficit is not granger causing the current account deficit, one can safely say that if austerity measures do not lead to debt containments in the future then uncontrolled budget deficits and rising public debts may worsen even more the current account deficits, leading to more pressure on the growth rate of real GDP; rendering fiscal policies unsustainable.

5. Conclusions and Policy Recommendations

This study has analyzed thoroughly the sustainability of the EU-MED macroeconomic policies over the last three decades. Emphasis was, however, put on the recent financial and debt crises and on the post crisis period. Our empirical results have validated the Twin Deficit hypothesis in both samples; however, we found diverging findings regarding the direction of causality. While the trade balance seems to be driving the budget deficit in MED countries – thereby validating the current account targeting approach - the relationship appears to run in the opposite direction in the case of EU countries, where the budget balance appears to be driving the current account. Given the well-documented dependence of MED countries on trade with the EU and the fact that most EU countries have implemented austerity policies in the aftermath of the financial crisis – thereby restricting aggregate demand and imports - we argue that the ensuing drop in export income for MED countries has contributed to increasing the budget deficit in these countries, by virtue of the uncovered positive causality between the current account and the budget balance.

One natural response of policy makers in MED countries would be to implement austerity policies; however, such policies, which may be necessary, are socially costly in the current social context in MED countries, and would not alone permit to stabilize the budget balance given that they would leave the trade balance unaffected. Our findings thus represent

a warning against such 'ready-made' macroeconomic policy responses and indicate that austerity policy in EU countries have unexpected consequences for fiscal stability in MED countries. We thus call for a better coordination of macroeconomic policy between the EU and its Southern peripheral countries.

Other empirical results have indicated that MED exports, imports, government revenues, government expenditures, current accounts, budget balances, public and foreign debts are all non-stationary series pointing to the non-sustainability of fiscal and macroeconomic policies in all five countries under investigation. Cointegration results have also pointed to the non-existence of a long-run relationship between government revenues and expenditures, exports and imports, and exports and foreign debt. The same is true for the EU countries where exports, imports, government revenues and expenditures, current accounts, budget balances, and total public debt are all non-stationary series pointing also to the non-sustainability of fiscal and macroeconomic policies in all five EU countries under investigation. However, and for the EU panel, the results pointed to the existence of a long-run relationship between government expenditures and revenues. It is, therefore, clear that at least and over the period under consideration the EU countries under investigation have tried to keep fiscal policies, especially taxation policies, as well as, fiscal spending under control.

A major policy issue to be faced in the coming years is whether macroeconomic policies have reached a dead end and are in a bind. If traditional macroeconomic policies have not helped, are there any new directions that will not only solve the current financial/debt crises but also prevent future ones from developing? With respect to the introduction of macroeconomic stabilization programs in the EU and MED countries, there is obviously no room to use both monetary and fiscal policies in tandem to curb those macroeconomic imbalances. For the MED countries of Lebanon and Jordan with very limited fiscal space and fixed exchange rates and open capital accounts monetary policy is already ineffective in terms of macroeconomic stabilization. Egypt rendered its monetary policy more effective in dealing with external shocks after the recent move to a flexible exchange rate regime. Tunisia and Morocco seem to be also moving in that same direction. While fiscal space in the EU is also limited due to the past accumulation of huge public debts, the ECB policy remains an effective tool in preventing the EU's unsustainable fiscal policies form developing into further debt crises similar to the Greek debt crisis.

As argued above, with the current debt crisis unfolding in some EU countries, low GDP growth rates and oil prices and high debt levels in several MED countries, fiscal policy is clearly not a macroeconomic policy option anymore due to limited fiscal space. Also with fixed exchange rates, monetary policy is not a policy option in several MED countries including Lebanon and Jordan. With one monetary policy conducted by the ECB and the absence of a political union, EU countries have registered over the past decade significant current account and budget deficits. QE implemented by the ECB since 2015 is perhaps the only macroeconomic policy tool still available to avert an overall financial and debt crisis in the EU.

With limited fiscal space in almost all the MED and European countries, any expansionary fiscal policy like for instance the newly introduced measures in Lebanon's public employees' salary should have been avoided at this stage, given the current deteriorating macroeconomic fundamentals many MPs have been experiencing. Instead, austerity measures should have been introduced, but they should not target aggregate demand, in the short run, in order not to worsen the prevailing recession. Any newly introduced austerity measures should target the supply side of the economy. The proposed increase in Lebanon's value added tax from 10 to 11% is expected to renew the inflationary pressure and further appreciate the real exchange rate. This is also true for Jordan with a fixed exchange rate system. Instead, MPs' government should consider for instance to (1) Lower fiscal

spending; (2) Improve the tax collection system; (3) Increase the dividend/corporate tax rates; (4) Reorganize the social security system. Any potential austerity measures should be carefully designed so that any increase in taxes should target financial capital rather than labour, with a subsequent lower impact on aggregate demand and GDP growth rates. The potential tax increase should neither target productive sectors, nor sectors prone to international competition like for instance the real estate sector in Lebanon and several exporting sectors in the remaining MPs. Thus, austerity measures should be carefully designed so as to minimize their negative macroeconomic impact on those countries' economies.

Given the current fiscal/monetary indicators, taping new international sources of financing is becoming more and more difficult, rendering the financing of the current external debt unsustainable. Therefore, some MPs may be compelled to abandon their fixed exchange rate peg, and may have to introduce painful fiscal adjustment measures to generate the necessary foreign exchange from its own internal recourses to finance its external debt in the coming few years. In short, policy makers would need to move on several fronts to tackle regional fiscal unsustainability issues. First they should try to stimulate national saving by reducing the budget deficit, reduce domestic interest rates, and increase the rate of private saving; (2) Introduce timely needed fiscal adjustment measures, enhance the tax collection system and actively fight corruption; And (3) tackle the future implications that may emanate from an expected depreciation of the exchange rate.

The EU's and MED economies appear to be in a bind due to (1) Past accumulated public debts and large budget and current account deficits; (2) Bureaucracy, protectionist laws, restrictive labor laws; (3) the consequences of 2008 financial crisis and 2010 Arab spring; (4) Austerity measures and the prolonged tightening of fiscal policy; (5) Lack of a political and fiscal union; (6) Doubts about the success of QE; and (7) BREXIT which could lead to more exits from the EU. Some EU's countries (Greece, Italy, Ireland, Portugal, and Spain) and MPs (Egypt, Morocco, Tunisia, Syria, Jordan and Lebanon) stand at a crossroads in history, with changes sweeping many of these countries and creating an environment conducive to reform. Having missed a number of chances to introduce extensive macroeconomic and institutional reforms and make substantial progress in development, the current situation presents another golden opportunity. The social movements in the MED region, the European debt crisis, and the earlier series of financial crises have exposed the weaknesses of the adopted macroeconomic models and have raised questions as to how to reshape macroeconomic and social policies most effectively and create the space to address the needs of everyone in society, reaching even the most deprived. The neo-liberal economic model (International Monetary Fund) implemented in most European and MPs centered on fiscal and monetary stabilization and economic liberalization has yielded a relatively acceptable level of economic growth and, in general, managed to meet the goals of economic and financial stability. Monetary, fiscal, and inflationary pressures have, overall, been smoothed. However, the impact of such macroeconomic policy choices has not led to the desired outcomes in terms of debt reductions and containment, inclusive growth, human development, human rights, and political reforms. Indeed, in certain cases, fast liberalization has actually aggravated the macroeconomic imbalances, as well as, divisions in society, with economic and political marginalization increasing. In the light of a critical reassessment of the achievements and failures of EU and MPs economic policies, a new macroeconomic approach is being shaped, one which is more holistic, integrating the macroeconomic and social spheres in combination with strong institutions and democratization, ensuring full participation in the decision-making process. It is vital that policymaking should expand to accommodate these spheres and place them on an equal footage in the service of a long-term rights-based developmental vision.

The new macroeconomic model should reconsider macroeconomic policies that incorporate developmental priorities and would thus achieve structural macroeconomic change. Fiscal and monetary policies will be reshaped to achieve not only stabilization, adjustment and economic growth, but will also trigger the transformation required to generate growth that is broad-based, inclusive and sustainable. Within this context, and in this research project, such macroeconomic stabilization policies have been reassessed for the purpose of proposing new policies that are sustainable and that will be conducive to growth, development, and debt and budget deficit reductions. At the same time, macroeconomic policies should not shy away from meeting the same objectives as social policy under this new development paradigm, in which the interests and welfare of every person in society are the target. It is also of central importance to ensure that social policy goes hand-in-hand with macroeconomic policy to bring about the required transformation and ensure inclusive economic growth. While the social and economic spheres interconnect to create synergies, this new macroeconomic model will not achieve its goals if political and institutional reforms remain as they are. The objective is to reinstitute democratic values and have strong developmental political systems.

Monetary Policy will remain ineffective as long as expectations of the private sector are not adjusted positively, and banks remain in poor shape, mainly Italian and Greek banks. The Greek Debt crisis is negatively affecting the behavior and expectations of businesses and consumers, and austerity measures are negatively affecting aggregate demand and the growth rate of GDP. In particular, stagnant wages and high unemployment rates are adversely affecting domestic demand, especially in the absence of fiscal space in most MED and EU countries due to the accumulation of large public debts and recurrent budget and current account deficits.

In the MED region, the ineffectiveness of monetary policy is due to the presence of fixed exchange rates and free capital movements. This boils down to no role for government policies (fiscal and monetary) to deal with the current macroeconomic imbalances paving the way for future fiscal and currency crises. Thus, the various EU and MED governments will need to: (1) reduce the public sector in favor of the private sector; (2) channel liquidity to the private sector through loans and encourage investments in productive ventures; and (3) reduce government spending and increase supply side taxes.

Finally, given the ineffectiveness of both monetary and fiscal policies, the private sector needs to take a leading role in addressing macroeconomic imbalances by first improving its expectations in both the EU and MED. This would increase the growth rate of GDP and would render debt more sustainable. Once the above is achieved, introduce austerity and structural adjustment measures. This will insure sustainable economic growth and will reduce the likelihood of a future debt and currency crisis.

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