Società italiana di economia pubblica

PUBLIC DEFICITS, FISCAL BURDEN AND NAIRU.

AN EMPIRICAL RESEARCH ON OECD COUNTRIES (1980-2009)

SILVIA FEDELI – FRANCESCO FORTE – OTTAVIO RICCHI

Silvia Fedeli* –Francesco Forte° – Ottavio Ricchi^

Public deficits, fiscal burden and NAIRU.
An empirical research on OECD Countries (1980-2009)

- Giugno 2011, versione preliminare e incompleta -

Abstract

We investigate the long run relationship among No Accelerating Inflation Rate of Unemployment, NAIRU, the underlying government net lending as a percentage of potential GDP, UNLG/pot.GDP, and other fiscal policy variables in their relation to GDP, i.e., the total, public expenditures, the total expenditure net of interests, as well as the interest expenditure and the total receipts of general government (the latter taken as a proxy of the fiscal burden). In the short run, we control for additional structural variables which may be credited to affect the NAIRU, in particular the rate of growth of labour productivity and the output gap.

With respect to Fedeli and Forte (2010), that with the same panel of 22 OECD countries (1980-2009) estimated a cointegrating relationship between unemployment rate and the net lending Government to GDP, when considering structural variables, in addition to UNLG/pot.GDP, also the fiscal burden results relevant in the long run. As for the short term we find that the output gap and the rate of change of productivity are both significant in affecting NAIRU .

*°Sapienza – Universita' di Roma
Dipartimento di Economia e diritto
Via del Castro Laureanziano 9
00161 Roma
*silvia.fedeli@uniroma1.it
°francesco.forte@uniroma1.it

^Ministero dell'Economia e Finanze
Via XX settembre
Roma
^ottavio.ricchi@tesoro.it

1. Introduction

In the 1970s, the Keynesian approach – according to which market economies are inherently unstable and unable to generate an aggregate demand high enough to guarantee full employment in the economy - advised governments to intervene in order to sustain aggregate demand via public deficit. This paper focuses on the effects of deficits and other macro fiscal policies' indicators on the structural unemployment as measured by the NAIRU (No Accelerating Inflation Rate of Unemployment).

The Keynesian[1] views, emphasising demand-driven economic growth, have suggested the adoption of permissive fiscal policies both for the short and the long term.[2] The assumption was that, in the presence of unemployment, public debt would have not crowded out private investment. Truly, public deficit would shift resources from taxpayers to bond holders, but taxpayers' wealth would be increased by the positive effect of the debt on growth without disturbing intergenerational equity.[3] Inherent to this reasoning is the idea that the new deficit would have not increased the ratio of debt to GDP. However, in the '70s public debt ratios to GDP rose considerably in many countries.[4] Other economists have argued that what matters is not deficit spending *per se*, but rather the type of intervention. A huge literature on this subject appeared in the early '90s - including, among others, Giavazzi and Pagano (1990), Ardagna (2004), Giavazzi, Jappelli and Pagano (2000), McDermott and Wescott (1996), Von Hagen and Strauch (2001), and more recently, OECD (2008) and IMF (2009) and Alesina and Ardagna (2009) – and supported the view that fiscal stimuli based upon tax cuts are more likely to increase growth than those based upon spending increases[5] After

---

[1] It should be mentioned that Keynes probably believed it was necessary to concentrate on the shorter term to "save capitalism", in periods of great depression, as that during which he wrote his General Theory. The long run negative effects of fiscal policies increasing deficit and debt were not worrying him also because– without any empirical evidence – he assumed that in mature economies there is a structural excess of savings.

[2] This view basically implies that public debt does not pose a problem if the government runs this debt in the home country: no resources are lost and public deficits merely reallocate resources from taxpayers to bond holders.

[3] The intergenerational redistribution also justifies a non Keynesian type of golden rule of public finance according to which government should finance public investments that yield long term benefits through public deficit, in order to make future generation contribute to the financing. If future generations benefit from current investment, their financing of the debt is fair and justified, otherwise they should bear all the costs but only part of the benefits.

[4] This evolution has raised the question of the sustainability over time of the public debt path (starting with the seminal paper by Hamilton and Flavin (1986) and up to Greiner and Fincke (2009)).

[5] In a VAR framework, Romer and Romer (2007) considered changes in the US federal tax legislation undertaken either to solve an inherited budget deficit problem or to achieve long-term goals, and estimated the effect of such changes on real output. Blanchard and Perotti (2002) identified exogenous changes in fiscal policy and estimated fiscal multipliers both on the tax and on the spending side of the government. They found that positive government spending shocks increase output and consumption and decrease investment, while positive tax shocks have a negative effect on output,

the 2007 crisis, when governmental deficit spending was used to remedy the credit crisis caused by deficit lending due to financial markets malfunction, unemployment remained high in spite of high deficit. Krugman (2010) and Krugman and Wells (2010) argue that, for the US, the reason for this is that there has not been enough deficit yet and they ask for new deficit both by increases of public spending of any kind and reduction of taxes.

On the other hand, Jeffrey Sachs (*Financial Time*, 2010) argued that the US fiscal stimulus policies generating deficit have failed their objectives in terms of GDP growth and employment:[6] In this line, Bertola (2011) recognises that labor market policies (like most taxes) are expensive in terms of output efficiency but their main purpose is not the maximization of aggregate employment and output, it is rather the protection of workers from wage variability and job losses and the distribution of incomes to disadvantaged individuals. Further, he argues that labour market policies might not directly increase government deficits if the revenue of labour taxes is used to finance unemployment and employment subsidies. Nevertheless, interfering with labour markets reduces aggregate employment and productivity. Therefore, it will be harder for policymakers to address risk and distribution issues when those effects are more detrimental (Bertola, 2011). Fedeli and Forte (2011) have found a cointegrating relation between unemployment rate and net lending government ratio to GDP for OECD countries. This was interpreted as supporting the view that fiscal deficit policies in the long run aggravate unemployment and *viceversa*. The tests, repeated for the OECD countries belonging to the European Union, reveal a stronger negative effect of the deficit on employment for the EU countries as compared to the whole sample. The insight of Fedeli and Forte (2011) is that public deficit and unemployment are intertwined in the long run.

Here we further investigate the issue and find out that the variables that are traditionally credited to influence the labor market equilibrium can, jointly with public deficit, find room in a

---

consumption and investment. Mountford and Uhlig (2008) found that both tax and spending increases have negative effects; however, spending increases do not generate an increase in consumption, whereas deficit-financed tax cuts are the most effective way to stimulate the economy. The positive effect of government spending on private consumption was also challenged by Ramey (2008), who found that consumption declines after increases in government spending.
A substantial literature has investigated political and institutional effects on fiscal policy and, in particular, on the propensity of different parties in different institutional settings to prolong fiscal imbalances, or to reign them in promptly. On politico-institutional effects, such as the role of electoral laws, on the occurrence of loose or tight fiscal policy, see Persson and Tabellini (2003) and Milesi Ferretti, Perotti and Rostagno (2002). On delayed fiscal adjustments, see Alesina and Drazen (1999). Alesina Perotti and Tavares (1998) study which parties are more (or less) likely to run fiscal stimuli or fiscal adjustments.

[6] He argues that the US fiscal policies used to re-launch the US economy both in the short and in the long run have always found the public consensus, even in the presence of increasing debts, because of the *mere political appeal* of both tax cuts and rising public expenditures. On the other hand "Governments are fighting for market credibility via draconian cut in spending. This too is the wrong approach. We should avoid a simplistic austerity to follow the simplistic stimulus of last year. (…) First, governments should work within a medium-term budget framework of five years, and within a decade-long strategy on economic transformation. Deficit cutting should start now, not later, to achieve manageable debt-to-GDP ratios before 2015."

cointegrating relationship. With this purpose, we abstract from the short term interaction between deficit and unemployment and concentrate upon structural issues. In fact, we choose to analyze the determinants of the NAIRU (on this issue see also Gianella et al. (2009).

In section 2 we report evidence on the relation between NAIRU as dependent variable and the considered fiscal policy variables We refer to a panel of 22 OECD countries for a maximum time period from 1980 to 2009. In section 3 we test for co-integration among the considered variables. Conclusions follow in section 4.

2. Unemployment rate and government policies

In the recent years policies of fiscal deficits have played a major role *vis a vis* the financial crisis with controversial results in terms of effectiveness. On the one side, one may argue that government deficits can smooth out the implications of temporary shocks caused by malfunctioning of the financial markets. For this reason, policies targeted to the labour market have been prominent in many countries. On the other side, the need to service or reduce public debt, originating from such policy choices, might result in higher unemployment and lower quality employment and output, that decrease the denominator of public debt/GDP ratios and endanger the sustainability of public finances. (Bertola, 2011)[7]

Although it is too early to assess by an econometric research the appropriateness of these policies for the last financial crisis, here we want to throw some light on the issue by examining what the past experience may teach. Therefore, based on Fedeli and Forte (2011) who find a cointegrating relation between unemployment rate and net lending government ratio to GDP, we further explore the fact that labour market and fiscal policies are intertwined not only in the short term. Short term links are due to automatic stabilizers and to the reaction of discretionary policy to the economic cycle. The latter can be procyclical or countercyclical according the priorities of the policy maker; the Keynesian approach calls for expanding the deficit in case of economic downturns, but occasionally the policy maker might want to attempt to consolidate the budget. We investigate the issue in order to find out whether the variables that are traditionally credited to influence the labor market equilibrium can, jointly with public deficit, find room into a cointegrating relationship. Following Gianella et al. (2009), who studied the impact of structural factors directly on the Natural Rate of Unemployment (NAIRU), we abstract from the interactions

---

[7] Bertola (2011) analyses the specific impact (on employment and unemployment rates) of unemployment insurance generosity and active labor market policies as compared with labour tax rate and public interest payments in different groups of countries: Nordic (Denmark, Finland, Norway, Sweden), Anglo-Saxon (Australia, Canada, Ireland, United Kingdom, United States), Continental (Austria, Belgium, France, Germany, Netherlands), Mediterranean (Italy, Portugal, Spain).

that takes place in short term and that are linked to the cycle. We thus concentrate mostly on the long term determinants of the NAIRU still considering the impact of the public deficit as in Fedeli and Forte (2011). Within this framework, however, the correct measure of the public finance stance is represented by underlying government net lending as a percentage of potential GDP. In fact this variable provides an estimate of the public deficit to GDP ratio once that the impact of cyclical conditions and of temporary fiscal policy intervention has been removed. The actual budget balance does reflect the cyclical component of economic activity and therefore fluctuates around the structural budget balance. In contrast, the structural budget balance reflects what government revenues and expenditures would be if the output was at its potential level and therefore it does not reflect cyclical developments in economic activity. Changes in the structural deficit may thus provide some indication of the degree of stimulus or restraint that the government should provide to demand (fiscal impulse) over and above that provided by automatic stabilisers, or a measure of the degree of fiscal consolidation.

We also test the presence in a cointegrating relationship of several other fiscal policy's indicators. Amongst the policy variables we have evaluated the statistical significance of a few budget items that, in addition to the deficit, are intended to convey the impact of fiscal policy and that could affect directly or indirectly the equilibrium rate of unemployment. To start with, we included general government total receipts as a percentage of GDP, which represents the overall tax burden imposed on the economy. The average tax wedge on labour is, in fact, a dubious indicator under a system of progressive taxation, because of the different effective rates on the different kinds of wage earners. In this respect one may argue that an high tax burden generally implies an high tax on labour whether directly or indirectly through consumption taxation. We also consider the total government expenditures as a percentage of GDP. This variable provides a measure of the share size of the public sector which, in a strand of the economic literature, is credited to crowd out productive (private) expenditure. The grasp provided by the usage of these "simple" public finance variables is that the public sector size will generate inefficiencies and costs which, on their turn, will affect the structural unemployment. Using very much the same argument, i.e. controlling for factors that in the medium term could drive output behaviour, we considered also competitiveness variables such as real effective exchange rate.

In addition to including complementary variables in the cointegrating vector, the specification proposed by Fedeli and Forte (2011) here is also enhanced by modelling the short term behaviour of the dependent variable. As already stated, interactions between unemployment rate and the budget deficit which are due to the cycle should be cancelled out by our choice of using the NAIRU as dependent variable and the underlying deficit to GDP as a percentage of potential GDP

as explanatory variable. However, although the NAIRU is a medium term notion, we postulate the presence of short term factors that affects its year on year changes (i.e its annual dynamics). In modelling the short term we have evaluated, in turn, the significance of the above mentioned competitiveness variables and of the public consumption to GDP ratio. In our list of variables we also included the rate of growth of labour productivity as direct measure of the efficiency of the economy. Productivity is not a policy variable but may be influenced by structural reforms.[8] Its impact on the NAIRU is disputed and this is an important reason to test it. One additional reason for allowing for its presence in the specification is that it acts as a control with respect to the underlying deficit to GDP ratio. Indeed the latter variable could have a different impact on the unemployment rate depending on the productivity behaviour. A rising productivity drives up the denominator of the ratio of deficits to GDP and a better performance of productivity may encourage to undertake new investments. However it remains to be seen whether this implies additional employment. Finally, particularly important for our short term analysis, the impact of the output gap helps to identify and isolate the impact of cyclical factors still present in the NAIRU. Thus, short-term improvements in NAIRU due to a pick-up in economic activity may be reversed as activity slows down and should therefore not be seen as an underlying structural improvements.

3. The model

We verify co-integration by using a panel consisting of 22 OECD countries and spanning the years 1980 to 2009; the data have annual frequency and the variables are taken in levels. The countries considered are Japan, New Zealand, the USA, Australia, Canada, Iceland, Norway, plus 15 OEDC countries belonging to the European Union (i.e. Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, , the Netherlands, Portugal, Spain, Swiss, Sweden, the UK).

The basic long run model we can postulate after the tests on the variables mentioned in section 2, is between NAIRU and Underlying government net lending (percentage of potential GDP), UNLG/pot.GDP, general government total receipts as a percentage of GDP, Gov.tot.receipts/GDP. It can be specified as follows

$$NAIRU_{it} = \theta_{0i} + \theta_{1i}(\text{UNLG/pot.GDP})_{it} + \theta_{2i}(\text{Gov.tot. receipts/GDP})_{it} + \mu_i + \varepsilon_{it}$$

(1)

---

[8] There is an ever growing literature on policy impact on productivity. This out of the scope of this paper, for a discussion on the issue see for instance IMF (2008).

where i = 1, 2,.. , N is the number of nations; t = 1, 2,.. , T represents the number of periods. If the variables are I(1) and cointegrated, then the error term is I(0) and the error correction specification of NAIRU contains the error-correction speed of adjustment parameter and the long-run coefficients θ_{1i}, θ_{2i}, and θ_{3i}.

As for the short term, the error correction specification is

$\Delta NAIRU_{it} =$

$= \Phi_i [NAIRU_{i,t-1} \theta_{0i} + \theta_{1i}(UNLG/pot.GDP)_{it} + \theta_{2i}(Gov.tot. receipts/GDP)_{it}] + \delta_{11i} output\ gap_{it} + \delta_{21i} tc\ lab\ prod_{it} + \varepsilon_{it}$

(2)

The error-correction speed of adjustment parameter, Φ_i and the long-run coefficients, θ_{1i} and θ_{2i}, are of primary interest. With the inclusion of θ_{0i}, a nonzero mean of the cointegrating relationship is allowed. One would expect Φ_i to be negative if the variables exhibit a return to long-run equilibrium.

In what follows we report only the tests resulting significant for our cointegration analysis. The tests of all the variables mentioned in section 2 are available from authors on request. Notice here that public expenditures on GDP as well the competitiveness variables do not pass the cointegration test and therefore do not enter in the cointegration vector.

The first step in our analysis has been to test whether the variables are nonstationary or not. We employ the test of Im *et al.* (2003) based on the assumption of no cross-sectional dependence. The tests are normally distributed under the null hypothesis of nonstationarity and permit the individual autoregressive roots to differ across the cross-sectional units. For the implementation of the test, all bandwidths and lag lengths are chosen according to $4(T/100)^{2/9}$. The number of lags is chosen according to the Akaike criterion. The test results reported in Table 1 indicate a rejection of the null at the 5% level of significance.

Table 1. Im-Pesaran-Shin (2003) test on 22 OECD countries.
    Deterministics chosen: constant and trend; augmented by 2 lags (average)

```
    NAIRU
    t-bar test, N,T = (10,40)        Obs = 370
    Augmented by 2 lags (average)
        t-bar     cv10      cv5       cv1   W[t-bar]    P-value
        -2.182   -2.500    -2.600    -2.780   -0.232     0.408


    UNLG/pot.GDP
    t-bar test, N,T = (17,30)        Obs = 459
        t-bar     cv10      cv5       cv1   W[t-bar]    P-value
        -1.879   -2.410    -2.480    -2.610   1.026      0.848
    Gov.tot.receipts/GDP
    t-bar test, N,T = (15,40)        Obs = 555
        t-bar     cv10      cv5       cv1   W[t-bar]    P-value
        -1.724   -2.440    -2.520    -2.670   1.832      0.967
```

Thus, based on the panel unit root test proposed by Im et al. (2003), we are able to reject the presence of a unit root in either variable, moreover, once a linear time trend has been accommodated, the null hypothesis is also rejected. We therefore conclude that the variables appear to be nonstationary.

The second step is to test whether the variables are co-integrated. We apply first the Kao (1999) tests on co-integration to data on NAIRU, UNLG/pot.GDP, Gov.tot.receipts/GDP. The results presented in Table 2 show cointegration among the mentioned variables.

Table 2. Kao Residual Cointegration test on 22 OECD countries.

Kao Residual Cointegration Test
Series: NAIRU, UNLG/pot.GDP, Gov.tot.receipts/GDP
Sample: 1980 2009
Included observations: 30
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-3.097721	0.0010

Residual variance	0.169088
HAC variance	0.290535

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Panel Least Squares
Sample (adjusted): 1982 2009
Included observations: 28 after adjustments
Cross-sections included: 26
Total pool (unbalanced) observations: 641
Cross sections without valid observations dropped

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID?(-1)	-0.086623	0.011112	-7.795511	0.0000
D(RESID?(-1))	0.551847	0.033440	16.50271	0.0000

R-squared	0.320388	Mean dependent var		0.002820
Adjusted R-squared	0.319324	S.D. dependent var		0.432836
S.E. of regression	0.357103	Akaike info criterion		0.781531
Sum squared resid	81.48696	Schwarz criterion		0.795456
Log likelihood	-248.4807	Hannan-Quinn criter.		0.786936
Durbin-Watson stat	2.092481			

We further apply the Westerlund (2007) (see also Persyn and Westerlund, 2009) tests on co-integration. Even in this case, the results presented in Table 3 suggest that we cannot reject the null hypothesis of no co-integration at the 1% level for NAIRU, UNLG/pot.GDP, Gov.tot.receipts/GDP. The calculated values of the error correction statistics are presented along with bootstrapped p-values. When using the bootstrapped p-values, we see a clear rejection of the null hypothesis, at the at the 1% level, which we take as further evidence in favour of co-integration.

Table 3. Westerlund ECM panel co-integration tests NAIRU, UNLG/pot.GDP, Gov.tot.receipts/GDP

```
       Results for H0: no cointegration
       With 22 series and 2 covariates
       Average AIC selected lag length: .95
       Average AIC selected lead length: 0


       ------------------------------------------------+
       Statistic |   Value   |  Z-value  |  P-value  |
       ----------+-----------+-----------+-----------|
            Gt   |  -2.291   |  -4.069   |  0.000    |
            Ga   | -10.874   |  -4.332   |  0.000    |
            Pt   | -16.054   |  -8.774   |  0.000    |
            Pa   |  -8.132   |  -5.390   |  0.000    |

       ------------------------------------------------+.
```

Finally in table 4 the estimates for the 22 OECD countries are presented as a two-equation model: the normalized cointegrating vector (labeled as EC) and the short-run dynamic coefficients (labelled as SHORT RUN). The model in (2) has been fit allowing panel-specific intercepts. The dynamic FE estimator restricts the cofficients of the cointegrating vector to be equal across all panels. The FE model further restricts the speed of adjustment coefficient and the short-run coefficients to be equal. An allowance for intragroup correlation in the calculation of standard errors is made with the cluster on countries.

Table 4. Dynamic Fixed Effects Regression: Estimated Error Correction Form

```
--------------------------------------------------------------------------------
Standard errors adjusted with cluster(country_numerico) option.
--------------------------------------------------------------------------------
 (Estimate results saved as DFE)
--------------------------------------------------------------------------------
                      |    Coef.   Std. Err.     z    P>|z|     [95% Conf. Interval]
----------------------+---------------------------------------------------------
EC
  UNLG/pot.GDP        | -.6406943  .1671228    -3.83  0.000   -.968249   -.3131396
  Gov.tot.receipts/GDP|  .2815833  .1096609     2.57  0.010    .0666519   .4965148
-------------+-------------------------------------------------------------------
SHORT RUN
                  ec  | -.0860541  .0172272    -5.00  0.000   -.1198188  -.0522895
          output gap  | -.0450562  .0072067    -6.25  0.000   -.0591809  -.0309314
D1.lab.prod.growth rate| .0103659  .0038715     2.68  0.007    .0027779   .017954
           constant  | -.6136132  .431793     -1.42  0.155   -1.459912   .2326855
--------------------------------------------------------------------------------
```

The first equation (EC) presents the normalized cointegrating vector. The vector has been normalized such that the coefficient on the first term (i.e. on NAIRU) in the cointegrating vector is 1. Accordingly, the normalized term is omitted from the estimation output. In the output, the estimated long-run effect of UNLG/pot.GDP on NAIRU is significant and negative as expected. This is in line with the result of Fedeli and Forte (2011). Here, however, we refer to the structural budget balance which measures what the balance of tax revenues less government expenditure would be if actual GDP corresponded to potential GDP. The result that underlying structural deficits increase NAIRU in the long run indicates the need for effort and specific policy actions to redress the situation. Also, the estimated Gov.tot.receipts/GDP is significantly positive. This means that the increase of the fiscal burden increase the NAIRU. This result confirms that a reduction of the tax burden, under an invariant UNLG/pot.GDP, stimulates GDP growth and employment. Indeed high taxes may weigh heavy on labour (directly by the fiscal wedge or indirectly taxing mass consumptions), on capital or on entrepreneurs, thus, discouraging employment, savings, investments, productivity and the development of enterprises.

The second equation (SHORT RUN) reports the coefficients from the dynamic FE model. The **ec** term is properly signed and significant. In the short term the NAIRU results to be affected by the output gap which takes negative sign and by the rate of growth of labour productivity (taken in first differences) which takes positive sign. The negative impact of the output gap shows that cyclical factors are still present in the NAIRU and therefore that short-term improvements in NAIRU may be reversed as activity slows down. The positive sign of the rate of growth of labour productivity (taken in first differences) might seem a questionable result. Indeed, a quickly rising productivity makes it more sustainable the public finances and less likely the risk of future tax increases. However, a better performing economy, while encouraging firms in locking in resources or undertaking fixed investment has a negative effect on the reduction of structural unemployment.

4. Preliminary Conclusions

With a panel of 22 OECD countries (1980-2009), we investigated the long run relationship between NAIRU and the underlying government net lending as a percentage of potential GDP, UNLG/pot.GDP, and other fiscal policy variables, in their relation to GDP, i.e., the total, public expenditures, the total expenditure net of interests, as well as the interest expenditure and the total receipts of general government (the latter taken as a proxy of the fiscal burden). Moreover we tested for the short term behaviour of NAIRU, controlling for additional structural variables which may be credited to affect it, in particular the rate of growth of labour productivity and the output gap.

When considering structural variables, in addition to UNLG/pot.GDP, also the fiscal burden is relevant in affecting the NAIRU in the long run: *ceteris paribus*, the increase of the fiscal burden increase the NAIRU. This result is not unexpected given that, if one agrees that a reduction of the tax burden, under an invariant UNLG/pot.GDP, stimulates GDP growth and employment. Indeed high taxes may weigh heavy on labour (directly by the fiscal wedge or indirectly taxing mass consumptions), on capital or on entrepreneurs discouraging employment, savings, investments, productivity and the development of enterprises. On the other hand, the fiscal deficit diverts savings from investments in the market sector and even if some fiscal deficits are related to public investments, this is not the most frequent case and not always public investments are productive. Because a high tax burden reduces the growth rate the ratio of deficits to GDP tends to increase *ceteris paribus* as for their absolute amount. Thus the combination between high tax burden and high deficits causes and increase of NAIRU. One may ask why under these conclusions a cointegration among the NAIRU does not emerge including also the ratio of public expenditure to GDP. The answer may be that the same ratio of public expenditure to GDP may be devoted either to purchase goods and services and transfers or to hire wage earners with positive effects of employment. On the other hand, on the side of the independent variables, the public expenditure is financed either by an equivalent amount of taxes or by a fiscal deficit added to a lower amount of taxes.

References

Abrams, A. B. (1999) The effect of government size on the unemployment rate, PUBLIC CHOICE, 99, 395–401.

Alesina A. and S. Ardagna (2009), Large Changes in Fiscal Policy: Taxes Versus Spending, in "NBER Working Paper", No. 15438.

Alesina, A. and A. Drazen (1991) "Why are Stabilizations Delayed?"AMERICAN ECONOMIC REVIEW, 81, 1170-1188.

Alesina A. and R. Perotti (1996) Fiscal discipline and the budget process, AEA PAPERS AND PROCEDINGS, vol.86 N.2

Alesina A., R. Perotti, and J. Tavares, 1998, The Political Economy of Fiscal Adjustments, BROOKINGS PAPERS ON ECONOMIC ACTIVITY, Spring.

Ardagna S. (2004), "Fiscal Stabilizations: When Do They Work and Why", EUROPEAN ECONOMIC REVIEW, vol. 48, No. 5, 1047-1074.

Barro, R. J. (1991) Economic growth in a cross-section of countries, QUARTERLY JOURNAL OF ECONOMICS, 51, 407–43.

Blanchard, O.J. and R. Perotti, (2002), "An Empirical Investigation of the Dynamic Effects of Changes in Government Spending and Revenues on Output", QUARTERLY JOURNAL OF ECONOMICS, 1329-1368.

Brennan G. and J. M. Buchanan, (1980), The Power to Tax : Analytical Foundations of a Fiscal Constitution, New York, Cambridge University Press; in   THE COLLECTED WORKS OF JAMES M. BUCHANAN, (1999) vol. 7, Indianapolis Liberty Fund .

Buchanan, J. M. (1962) Predictability: The criterion on Monetary Policy, in Yeaeger Leland B. (editor) IN SEARCH OF A MONETARY CONSTITUTION, Cambridge, Harvard University Press

Buchanan, J. M. (1966), The Icons of Public Debt, in Journal of Finance, vol. n. 3 September 1966 and in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Five, Confessions of a Burden Monger,

Buchanan, J. M. (1986 a), Public Debt and Capital Formation, in Lee Dwight (editor), Taxation and the Deficit Economy : Fiscal Policy and Capital Formation in the United States, San Francisco, Pacific Research Institute for Public Policy, in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Five, Confessions of a Burden Monger

Buchanan, J. M. (1986 b), The Economic Consequences of the Deficit, Economia delle Scelte Pubbliche, n.3, in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Seven, The Constitution of a Debt- Free Polity,

Buchanan, J. M. (1987a) Budgetary Bias in PostKeynesian Politics . The erosion and Potential Replacement of Fiscal Norms, in Buchanan J.N, Rowley Charles and Tollison Robert D, (editors), (1987) Deficits, New York, Blackwell, and in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Seven, The Constitution of a Debt- Free Polity,

Buchanan, J. M. (1987 b) The Ethics of Debt Default, in Buchanan J.N, Rowley Charles and Tollison Robert D, (editors), (1987) Deficits, New York, Blackwell, and in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Seven, The Constitution of a Debt- Free Polity,

Buchanan, J. M. (1997), The Balanced Budget Amendment. Clarifying the Argument, Public choice, 90, in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Seven, The Constitution of a Debt- Free Polity.

Buchanan, J. M.., and Tollison, R.D. (1972). THEORY OF PUBLIC CHOICE. Ann Arbor: The University of Michigan Press.

Buchanan, J. M. and Vanberg V. (1986), Organization Theory and Fiscal Economics, .Society, State and Public Debt, Journal of Law, Economics and Organization, n.2 in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Seven, The Constitution of a Debt- Free Polity.

Buchanan, J. M. and Wagner R. (1977), Democracy in Deficits. The Political Legacy of Lord Keynes, New York, Academic Press, in THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 8, Indianapolis Liberty Fund

Buchanan, J. M., Rowley C. and Tollison R. (editors) (1987), DEFICITS, New York, Basil Blackwell. In THE COLLECTED WORKS OF JAMES M. BUCHANAN, vol. 14, Debt and Taxes, (2000), Indianapolis Liberty Fund, Part Seven, The Constitution of a Debt- Free Polity,

Buiter, W. H., G. Corsetti and N. Roubini (1993), "Excessive deficits: sense and nonsense in the Treaty of Maastricht", ECONOMIC POLICY, Issue 1; translated into Italian and published as "Disavanzo eccessivo, ragionevolezza e nonsenso nel Trattato di Maastricht", in RIVISTA DI POLITICA ECONOMICA, June 1993, pp.3-82. Reprinted in THE POLITICAL ECONOMY OF MONETARY UNION, Edited by Paul de Grauwe, pp. 297-331, Edward Elgar Publishing Ltd, Cheltenham, 2001.

Fedeli S., and F. Forte (2011) "Public Debt and unemployment growth: the need for fiscal and monetary rules. Evidence from OECD countries (1980-2009), in Forte F., Mudambi R., Navarra P. (eds.) HANDBOOK OF ALTERNATIVE THEORIES OF PUBLIC ECONOMICS. Edward Elgar UK. Forthcoming

Friedman, M, (1995), Balanced budget: Amendment must put limit on taxes. *Wall Street Journal 4:* A12,

Friedman, M, and Friedman, R, (1984), TYRANNY OF THE STATUS QUO. San Diego: Harcourt Brace Jovanovich,

Friedman M. (1968)," The role of monetary policy", AMERICAN ECONOMIC REVIEW, 58,

Gianella C., I. Koske, E. Rusticelli and O. Chatal (2008) "What Drives the Nairu? Evidence from a Panel of OECD Countries", OECD - ECONOMICS DEPARTMENT WORKING PAPER No. 57 replaced by N.649 (April 2009)

Giavazzi, F., T. Jappelli, and M. Pagano, 2000, Searching for Non-Linear Effects of Fiscal Policy: Evidence from Industrial and Developing Countries, EUROPEAN ECONOMIC REVIEW, 2000, vol. 44, n.7, 1259-1289.

Giavazzi F., and M. Pagano, 1990, Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries, NBER MACROECONOMICS ANNUAL, MIT Press, (Cambridge, MA), 1990, 95-122.

Greiner a., and Fincke B., 2009, PUBLIC DEBT AND ECONOMIC GROWTH, Springer

IMF, 2008, Structural Reforms and Economic Performance in Advanced and Developing Countries, IMF Research Department Board Paper

Krugman P. (2010) *New York Times*, February 4.

Krugman P., and Wells R.(2010) The way out of the slump, *The New York Review of Books* - October 14.

Hamilton, J.D, and M. Flavin (1986), On the limitation of government borrowing: a framework for empirical testing, AMERICAN ECONOMIC REVIEW, 76, 808-819.

Im, K. S., M. Peseran and Y. Shin (2003). Testing for Unit Roots in Heterogeneous Panels. JOURNAL OF ECONOMETRICS, Vol. 115, pp. 53-74.

McDermott J., and R. Wescott, 1996, An Empirical Analysis of Fiscal Adjustments, IMF STAFF PAPERS, vol. 43, n.4, 723-753.

Milesi-Ferretti G.M., R. Perotti, and M. Rostagno (2002) "Electoral Systems And Public Spending", THE QUARTERLY JOURNAL OF ECONOMICS, vol. 117(2), 609-657.

Modigliani F., (1988) The role of intergenerational transfers and the life cycle saving in the accumulation of wealth, JOURNAL OF ECONOMIC PERSPECTIVES, 2.

Mountford A., H. Uhlig, (2008), "What Are the Effects of Fiscal Plicy Shocks?" NBER Working Paper 14551.

Persson T. and G. Tabellini, (2003), THE ECONOMIC EFFECTS OF CONSTITUTIONS, MIT Press, Munich Lectures in Economics.

Persyn D. and J. Westerlund, (2009) Error-correction–based cointegration tests forpanel data, THE STATA JOURNAL 8, Number 2, pp. 232–241

Ramey V., (2008), "Identifying Government Spending Shocks: It's All in the Timing"

Razzolini L., and W.F. Shughart II, (1997), "On the (Relative) Unimportance of a Balanced Budget." PUBLIC CHOICE, 90, 215-233.

Ricardo David (1821 and 1951), ON THE PRINCIPLES OF POLITICAL ECONOMY AND TAXATION, III edition, London, John Murray, Albermarle-Street, reedited by (1951) Piero Sraffa with the collaboration of Maurice Dobb, Cambridge, At the University Press.

Romer C. and D. Romer, (2007), The Macroeconomics Effects of Tax Change: Estimates Based on a New Measure of Fiscal Shocks, NBER working paper 13264.

Sachs, J., (2010) Time to plan for post-Keynesian era, *Financial Time*, June 7,

Scully, G. W. (1989) The size of the state, economic growth and the efficient utilization of national resources, PUBLIC CHOICE, 63, 149–64.

Scully G.W. (1995), The 'growth tax' in the United States, PUBLIC CHOICE, 85(1–2), pp. 71–80.

Tobin J. (1965), The Burden of the Public Debt. A Review Article, JOURNAL OF FINANCE, vol. N. 4 December J. and in Ferguson D. (editor), Public Debt and Future Generations, and in J. Tobin (1966), National Economic Policy, Essays, vol III, Theory &Policy, Chapter 12, New Haven, Yale University Press

Trehan, B. and C.E.Walsh (1991) Testing intertemporal budget constraints: Theory and applications to US Federal budget and current account deficits, JOURNAL OF MONEY, CREDIT AND BANKING 23, 206-223

von Hagen J., R. Strauch, (2001), "Fiscal Consolidations: Quality, Economic conditions, and Success, PUBLIC CHOICE, vol. 109, no.3-4, pp 327-346

Warsh D. (2009) "Towards a Fiscal Constitution", *Economic Principals an independent weekly* June,21.

Westerlund, J. 2007. Testing for error correction in panel data. OXFORD BULLETIN OF ECONOMICS AND STATISTICS 69: 709–748.

Yaeger L. ed. (1962) IN SEARCH OF MONETARY CONSTITUTION Cambridge, Mass., Harvard University Press.