Currency Devaluation, External Finance and Economic Growth: A Note on the Greek Case

Mariolis, Theodore

Department of Public Administration, Panteion University

March 2013

Currency Devaluation, External Finance and Economic Growth: A Note on the Greek Case

Theodore Mariolis
Department of Public Administration, Panteion University, Athens, Greece
E-mail: mariolis@hotmail.gr

ABSTRACT
This paper combines dynamic input-output price models with Thirlwall's extended model of balance of payments constrained growth to estimate the effect of a switch to drachma on domestic income. The findings suggest that a return to national currency would not necessarily deepen the recession, although a rather large nominal devaluation, i.e. in excess of 57%-60%, is necessary for the recovery.

Keywords: Drachma Devaluation; Greek Economy; Dynamic Input-Output Price Models; Thirlwall's Model
JEL classification: C67, D57, E11, E12, F41

1. Introduction

It has repeatedly been stated that a Greek exit from the Eurozone will lead to a vicious circle of drachma devaluation, inflation, lack of capital inflows, monetary financing of deficits, and recession. Thus, the application of internal devaluation policies, such as reduction in government expenditures and cuts in unit labour costs in the private sector, seems to be the only available solution to the so-called Greek crisis.

In a recent paper, using simple dynamic input-output price models and data from the most recent (2005) Symmetric Input-Output Table of the Greek economy, it has been estimated that the short-run elasticity of the gross value of domestic production with respect to the nominal exchange rate is no greater than 0.186. Thus, a drachma devaluation of, say, 50% does not imply great inflationary 'pressures', as is commonly believed; rather it could increase the competitiveness of the economy (as measured by the real exchange rate) by about 37% and decrease the deficit of the balance of goods and services by about 89% (Katsinos and Mariolis, 2012).[1] The purpose of the present paper is to estimate the *short-run* relationships between

[1] All those models have the same structure, which is *imposed* by the available Symmetric Input-Output Table of the Greek economy (it provides no data on fixed capital stocks, non-competitive imports and sectoral employment), but they are based on different assumptions about the response of sectoral gross value added to currency devaluation.

currency devaluation, external finance and growth for the Greek economy. In this effort, the basic price model of the aforementioned paper is combined with Thirlwall's extended model of balance of payments constrained growth (which includes both capital inflows and interest payments on external debt).[2]

The remainder of the paper is structured as follows. Section 2 presents the combined model. Section 3 applies the model using the available data of the Greek economy. Section 4 concludes.

2. The model

Thirlwall's extended model can be stated as follows:

$$PX - PI + PF = EP^{*}M \tag{1}$$

$$X = Q^{\eta_1} Y^{*\eta_2} \ , \ Q \equiv (EP^{*})P^{-1}, \ \eta_1 > 0 \, , \ \eta_2 > 0 \tag{2}$$

$$M = Q^{\eta_3} Y^{\eta_4} \ , \ \eta_3 < 0 \, , \ \eta_4 > 0 \tag{3}$$

where X denotes the volume of exports, M the volume of imports, P the domestic prices of exports, P^{*} the foreign prices of imports, E the nominal exchange rate (measured as the domestic price of foreign currency), I (>0) the real net interest payments, PF (>0) the nominal net capital inflows, Q the real exchange rate, Y^{*} the real foreign income, Y the real domestic income, η_1 the price elasticity of demand for exports, η_2 the income elasticity of demand for exports, η_3 the price elasticity of demand for imports, and η_4 the income elasticity of demand for imports. Equation (1) expresses the balance of payments constraint, and equations (2), (3) express the demand for real exports and imports, respectively.

Now, assume that (i) the production period is uniform across all industries; (ii) the input-output coefficients are fixed; (iii) there are no non-competitive imports; (iv) at least one commodity enters directly into its own production; and (v) the system is viable, i.e. the Perron-Frobenius eigenvalue of the irreducible and primitive $n \times n$ matrix of total input-output coefficients, $\mathbf{A}$, is less than 1. On the basis of these assumptions we can write

$$\mathbf{P} = \mathbf{PA} + \mathbf{v} \tag{4}$$

or

[2] For a recent overview of the extended versions of Thirlwall's (1979) model, see Thirlwall (2011).

$$\mathbf{P} = \mathbf{PD} + E\mathbf{P}^*\mathbf{G} + \mathbf{v} \tag{4a}$$

where $\mathbf{P} \equiv [P_j]$ $(> \mathbf{0})$ denotes the stationary price vector of domestically produced commodities, $\mathbf{D}$, $\mathbf{G}$ the irreducible and primitive matrices of domestic and imported input-output coefficients, respectively, $\mathbf{A} \equiv \mathbf{D} + \mathbf{G}$, $\mathbf{P}^*$ the *given* vector of foreign currency prices of the imported commodities, $\mathbf{P} = E\mathbf{P}^*$, and $\mathbf{v}$ $(> \mathbf{0})$ the vector of gross values added per unit activity level. By solving equations (4)-(4a) for $\mathbf{P}$ we obtain

$$\mathbf{P} = \mathbf{v}[\mathbf{I}_n - \mathbf{A}]^{-1} = (E\mathbf{g} + \mathbf{v})[\mathbf{I}_n - \mathbf{D}]^{-1} \tag{5}$$

where $\mathbf{g} \equiv \mathbf{P}^*\mathbf{G}$ and $\mathbf{I}_n$ denotes the $n \times n$ identity matrix. In order to analyze the effects of nominal exchange rate changes on prices we use the following well-known dynamic version of system (4a) (see, e.g. De Clementi *et al.*, 1988):

$$\mathbf{P}_{t+1} = \mathbf{P}_t\mathbf{D} + E_1\mathbf{g} + \mathbf{v}_t, \; t = 0,1,... \tag{6}$$

where $E_1 = (1+e)E_0$, e denotes the rate of devaluation, and $\mathbf{P}_0 = (E_0\mathbf{g} + \mathbf{v})[\mathbf{I}_n - \mathbf{D}]^{-1}$ (see equation (5)). When, *for example*, $\mathbf{v}_t = \mathbf{v}$, the solution of equation (6) is

$$\mathbf{P}_t = \mathbf{P}_0\mathbf{D}^t + (E_1\mathbf{g} + \mathbf{v})[\tilde{\mathbf{D}}]_{t-1} \tag{7}$$

where $[\tilde{\mathbf{D}}]_{t-1} \equiv [\mathbf{D}^{t-1} + \mathbf{D}^{t-2} + ... + \mathbf{I}_n]$, and $\mathbf{P}_t$ tends to $(E_1\mathbf{g} + \mathbf{v})[\mathbf{I}_n - \mathbf{D}]^{-1}$ $(< (1+e)\mathbf{P}_0)$ as t tends to infinity, since the Perron-Frobenius eigenvalue of $\mathbf{D}$ is necessarily less than 1. Thus, the elasticity of P_{jt} with respect to the nominal exchange rate can be determined from equation (7) (for alternative assumptions about the response of sectoral gross value added to currency devaluation, see Katsinos and Mariolis, 2012, pp. 165-166).

From equations (2) and (3), taking time rates of change of the variables, we obtain

$$x = (1+q)^{\eta_1}(1+y^*)^{\eta_2} - 1 \tag{8}$$

$$q = (1-\eta_p)(e^{-1} + \eta_p)^{-1} \tag{9}$$

$$m = (1+q)^{\eta_3}(1+y)^{\eta_4} - 1 \tag{10}$$

where lower-case letters denote proportional rates of change of variables, and η_p the short-run, i.e. for $t = 1$, elasticity of P with respect to E, which is estimated on the basis of equation (7). Substituting equations (8), (9) and (10) into equation (1) in growth rate form, and solving for the change rate of domestic income, yields:

$$y = H(e, c, y^{*}),\ e > -1 \tag{11}$$

where $H(\bullet) \equiv [(1+A)B^{-\eta_3}]^{\eta_6} - 1$, $\eta_6 \equiv \eta_4^{-1}$, $B \equiv (e^{-1}+1)(e^{-1}+\eta_p)^{-1}$,

$$A \equiv (1+e)^{-1}\{-e - \theta_1 + [\eta_p e(1+c) + c]\theta_2 + (1+\eta_p e)\theta_1[(e^{-1}+1)(e^{-1}+\eta_p)^{-1}]^{\eta_1}(1+y^{*})^{\eta_2}\}$$

$\theta_1 \equiv PX(EP^{*}M)^{-1}$, $\theta_2 \equiv PC(EP^{*}M)^{-1}$, $\theta_1 + \theta_2 = 1$, and $C \equiv -I + F$. Equation (11) gives the balance of payments constrained change rate of domestic income.

3. Application

In the year 2011, (i) the exports of goods and services of the Greek economy were approximately equal to 48.8 billion Euros, whereas the imports were approximately equal to 61.4 billion Euros, i.e. $PX \cong 48.8$, $EP^{*}M \cong 61.4$, respectively, and, therefore, $\theta_1 \cong 0.795$ and $\theta_2 \cong 0.205$; and (ii) $PI \cong 8.8$, where the interest payments on external debt equal 10.8 billion Euros, and $PF \cong 21.4$ (Bank of Greece, 2012, pp. 91 and 103-110). Furthermore, (i) η_1 is in the range of 0.60 to 0.71, and η_3, is in the range of – 0.90 to – 0.92 (in accordance with estimates of the IMF and the Bank of Greece; see, e.g. Malliaropoulos and Anastasatos, 2011, p. 10); (ii) η_2 should be considered as no greater than 1.16 (since the short-run income elasticity of demand for tourism is around that value; see Economou *et al*., 2010, pp. 36 and 217-218); (iii) η_4 is around 1.80 (Papazoglou, 2010, p. 230);[3] and (iv) η_p is in the range of 0.106 to 0.186 (depending on the response of $\mathbf{v}$ to currency devaluation; Katsinos and Mariolis, 2012, pp. 167-168).

Figure 1 is constructed on the basis of those alternative estimates, and graphically displays equation (11), with $\eta_2 = 1.16$, $\eta_p = 0.186$ and $y^{*} = 2\%$. Figure 2 also incorporates the assumption that, as a result of a Greek exit from the Eurozone, both the interest payments on external debt and the net capital inflows fall to zero, i.e. $c \cong -84.4\%$. It then follows that:

[3] McCombie and Thirlwall (1999, p. 49) note: "Estimates of η_2 and to a lesser extent of η_4, show considerable variation between countries and these disparities largely reflect differences in non-price competitiveness. […] Estimates of η_2 for the early post-war period for the advanced countries vary from 3.55 for Japan to 0.86 for the UK".

(i). For $e = 0\%$, y is almost -8.91%.

(ii). For $y = 0\%$, e is in the range of 42.34% to 56.97%. By reducing y^* to 1% (*or* η_2 to 0.90, i.e. $\eta_2\eta_4^{-1} = 0.5$), these values change to 45.83% (43.90%) and 61.97% (59.20%), respectively.

(iii). For, say, $y = 5\%$, e is in the range of 73.17% to 102.83%. These values imply a cost-push inflation rate (as measured by the gross value of domestic production) of 13.61% or 19.13%, and that the competitiveness of the economy (as measured by the real exchange rate) increases by 52.42% or 70.26%, respectively.

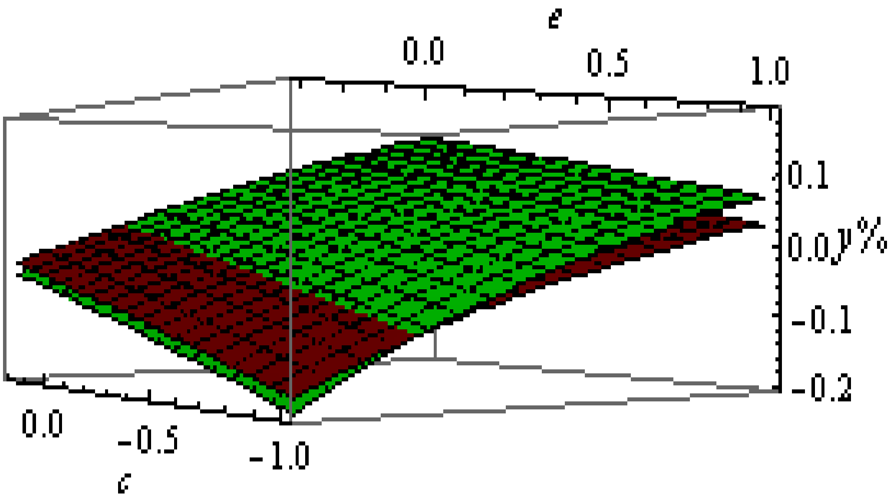

Figure 1. *The balance of payments constrained change rate of domestic income as a function of the nominal devaluation rate (– 30% ⩽ e ⩽ 100%) and the change rate of external finance (–100% ⩽ c ⩽ 20%)*

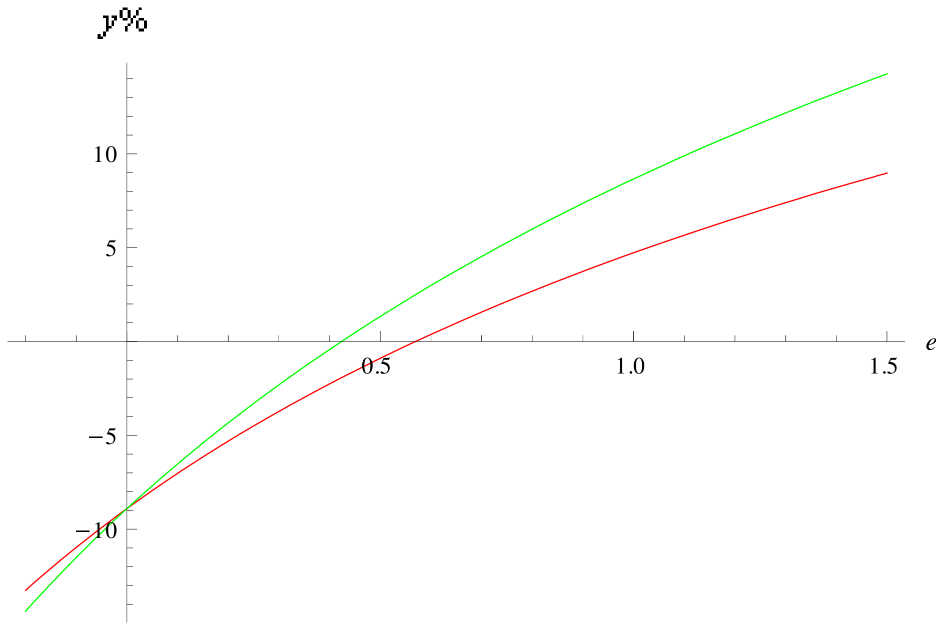

Figure 2. *The balance of payments constrained change rate of domestic income as a function of the nominal devaluation rate, for c = – 84.4%*

4. Concluding remarks

In terms of Thirwall's extended model, this paper dealt with the Greek trade-off between growth and sovereign debt default. The findings of this (hypothetical) exercise, based on not completely unrealistic assumptions, lend support to the view that a possible return to national currency not only does not necessarily deepen the recession but also a well-coordinated devaluation in excess of 57%-60% is a *necessary* condition for the recovery.

This exercise would seem most useful when it is compared to the avowedly painful (and questionable) process of internal devaluation, which so far has led to unprecedented unemployment rates (of almost 27%). Future work should search for more detailed, reliable data and build on the multi-sector/country versions of Thirlwall's model.

Acknowledgements
Earlier versions of this paper were presented at Workshops of the 'Study Group on Sraffian Economics' at the Panteion University, in May and September 2012: I am indebted to Kostas Papoulis, Nikolaos Rodousakis, Stelios Sfakiotakis, George Soklis and Eugenia Zouvela for helpful comments and suggestions. Furthermore, I am grateful to Lefteris Tsoulfidis for insightful discussions. The usual disclaimer applies.

References

Bank of Greece (2012) *Annual Report for the year 2011* (in Greek), Athens: Bank of Greece.

De Clementi, M., Morciano, M., Orlandi, A. and Perrella, R. (1988) Cumulative inflation and dynamic input-output modelling, in: M. Ciaschini (Ed.) (1988) *Input-Output Analysis. Current Developments*, pp. 149-165, London: Chapman and Hall.

Economou, G., Sampethai, I. and Simigiannis, G. (Eds) (2010) *The Current Account of Greece: Imbalances and Policy Implications* (in Greek), Athens: Bank of Greece.

Katsinos, A. and Mariolis, T. (2012) Switch to devalued drachma and cost-push inflation: a simple input-output approach to the Greek case, *Modern Economy*, 3 (2), pp. 164-170.

Malliaropoulos, D. and Anastasatos, T. (2011) Competitiveness, External Deficit and External Debt of the Greek Economy, *Eurobank Research: Economy & Markets,* 6 (7), April 2011.

McCombie, J. S. L. and Thirlwall, A. P. (1999) Growth in an international context. A Post Keynesian view, in: J. Deprez, J. and J. T. Harvey (Eds) (1999) *Foundations of International Economics. Post Keynesian Perspectives*, London: Routledge.

Papazoglou, C. E. (2010) *Introduction to International Economics* (in Greek), Athens: Symeon.

Thirlwall, A. P. (1979) The balance of payments constraint as an explanation of international growth rate differences, *Banca Nazionale del Lavoro Quarterly Review*, 32 (128), pp. 45-53.

Thirlwall, A. P. (2011) Balance of payments constrained growth models: history and overview, *PSL Quarterly Review*, 64 (259), pp. 307-351.