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A Balance of Payments Approach with
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The effects of internal and external imbalances on Italy's economic growth. A balance of payments approach with relative prices no neutral.

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Abstract

Recently, Soukiazis E., Cerqueira P., and Antunes M. (2013) developed a model – hereafter the SCA model - that takes into account both internal and external imbalances and where relative prices are not neutral in the pace economic growth. The SCA model can be considered as an extension of the well known Thirlwall's Law (Thirlwall, 1979) stating that growth can be constrained by the balance-of-payments when the current account is in permanent deficit. However, Thirlwall's Law focuses on external imbalances as impediments to growth and does not consider the case where internal imbalances (budget deficits or public debt) can also constrain growth. The recent European public debt crisis in the peripheral countries shows that when internal imbalances are out of control they can constrain growth and domestic demand in a severe way. The aim of this paper is to implement the more complete SCA model in Italy and check its accuracy for explaining the growth path in this country. Our empirical analysis shows mainly that Italy grew less than its potential capacity due to supply constraints. A scenarios analysis shows that improving external trade performance is the most effective way to achieve higher growth in Italy.

JEL code: C32, E12, H6, O4

Keywords: internal and external imbalances, price and income elasticities of external trade, equilibrium growth rates, 3SLS system regressions, supply constraints.

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1. Introduction

Thirlwall (1979) developed a simple model that determines the long run rate of growth of an economy consistent with the balance-of-payments equilibrium. Thirlwall established the rule that actual growth can be predicted by the ratio of export growth to the income elasticity of demand for imports or alternatively by the ratio of the income elasticity of exports to the income elasticity of imports times the growth rate of foreign demand¹. According to what became known as Thirlwall's Law, no country can grow faster than its balance of payments equilibrium growth rate, unless it can continuously finance external deficits by capital inflows. Growth is constrained by external demand, and balance-of-payments disequilibrium on the current account can be a serious obstacle to higher growth when it cannot be financed by available foreign resources. Another crucial implication of the model is that it is income and not relative prices that adjust to bring the economy back to equilibrium. For this reason international relative prices are neutral in the long term analysis.

A large number of empirical studies emerged testing the validity of Thirlwall's Law or criticising the basic assumptions that it relies on, namely that relative prices are constant in the long term and that current account is initially balanced. Among others, McCombie (1989), Moreno-Brid (1998-99), McCombie and Thirlwall (1994) and recently Blecker (2009) have made valuable contributions discussing and criticising the underlying implications of the Law.

¹ Thirlwall's Law is given by $\dot{y} = \frac{\dot{x}}{\pi}$ or alternatively $\dot{y} = \frac{\varepsilon}{\pi} \dot{y}^*$ where $\dot{y}$ is the growth of domestic income, $\dot{y}^*$ the growth of foreign income, $\dot{x}$ the growth of real exports, π the income elasticity of the demand for imports and ε the income elasticity of the demand for exports. To obtain these simple forms relative prices are assumed to be constant and balance of payments is in equilibrium (on the current account). For an application of this Law to Portugal see Soukiazis E. and M. Antunes (2012).

The hypothesis of constant relative prices has been criticized widely in the empirical literature (e.g. McGregor and Swales, 1985; 1991; Alonso and Garcimartín, 1998-99; López and Cruz, 2000). But in most studies in this field, relative prices have been shown to be statistically insignificant and even when they are significant the price elasticities with respect to imports and exports are very low in magnitude when compared to the income elasticities, revealing that imports and exports are less sensitive to price changes than to income changes. Blecker (2009) stressed that it is safe to conclude that the longer the time period considered, the more likely is that relative prices remain constant. The empirical evidence seems to support the idea that income is the variable that adjusts to equilibrate external imbalances, implying therefore that growth is indeed balance-of-payments constrained. On the other hand, increasing capital inflows can at most be a temporary way of relaxing the balance-of-payments constraint, since they do not allow a country to grow at the export-led cumulative growth rate in the long-term. What matters in the long-term analysis of growth is the growth of real exports.

Although Thirlwall's model has been modified to include capital flows and foreign debt, these studies have not considered the role of public imbalances as an additional constraint on growth. The recent experience of some peripheral European countries falling into a public debt crisis (including Italy) is the motivation to deal with this issue. As it is known, the implementation of an expansionary fiscal policy, aiming at strengthening growth rates and reducing unemployment, would not always achieve the desirable objectives (Pelagidis and Desli, 2004). It could be the case that budget deficits, financed either by money printing or by public borrowing, would increase public debt and interest rates, crowd out private investments, fuel inflation, and damage medium-term growth. The issue of whether budget deficits are always desirable has

many dimensions, including whether government borrowing is financing government consumption or investment in infrastructure, whether the deficit is sustainable, and how it is financed. On the other hand, the hesitation of many policy makers – especially in Europe – to rely more aggressively on fiscal policy measures in order to keep their public finances more or less balanced may lead to the possibility of a vicious cycle between low growth and higher deficit formation as a result of the reduction of tax revenues.

Our paper aims at contributing to this debate by using an alternative growth model, in the spirit of Thirlwall's Law that takes into account not only external, but also internal imbalances due to budget deficits and public debt. The model also considers that relative prices can play a significant role in the pace of economic growth. Our model (previously applied to Portugal) shows that the growth of domestic income is explained basically by external trade competitiveness, and also by factors related to fiscal policy and public finances that could affect economic growth negatively. The theoretical model is tested for the Italian economy that has recently (since 2011) been facing a serious problem in financing its public debt and was forced to implement austerities measures which are expected to have negative repercussions on growth in the following years.

Taking all these facts into consideration, the paper is organized as follows: in section 2 we present the theoretical growth model that takes into account internal and external imbalances and assumes that relative prices are not neutral; section 3 tests the model for the Italian economy trying to identify the main determinants of growth; a scenario analysis is provided in section 4 focusing on the factors that could foster growth in Italy, and the last section concludes.

2. Growth model with internal and external imbalances and relative prices not neutral.

Recently, Soukiazis et al. (2013) developed a multi equation model – henceforth the SCA(2013) model - to derive the reduced form of income growth which depends, among other things, on internal and external imbalances and relative prices are not neutral. This approach is in line with the balance of payments constrained growth hypothesis having though three particular differences: (i) it considers not only external imbalances (current account deficits), but also internal imbalances emerging from public deficit and debt; (ii) it considers the import contents of the components of demand; (iii) relative prices² are introduced explicitly into the growth model.

Our growth model can be described by the following equations³:

$$\dot{m} = \pi_c \dot{c} + \pi_g \dot{g} + \pi_x \dot{x} + \pi_k \dot{inv} + \delta_m (\dot{p}^* + \dot{e} - \dot{p}) \quad \text{Imports} \quad (1)$$

$$\dot{x} = \varepsilon_x \dot{y}^* + \delta_x (\dot{p}^* + \dot{e} - \dot{p}) \quad \text{Exports} \quad (2)$$

$$\dot{c} = \varepsilon_c \dot{y}_d \quad \text{Consumption} \quad (3)$$

$$\dot{inv} = \varepsilon_K \dot{y} + \varepsilon_r \dot{r} \quad \text{Investment} \quad (4)$$

In equation (1), the growth in demand for imports $\dot{m}$ depends on the growth rates of private consumption $\dot{c}$, government expenditures $\dot{g}$, exports $\dot{x}$, and investment $\dot{inv}$,

² The hypothesis that relative prices remain constant in the long term is a debatable assumption made in some studies for the sake of simplifying the specification of the model. However, some studies have shown that relative prices are important in international trade and explain a substantial part of growth especially in developing countries. As an example, Garcimartín et al. (2010-11) attribute the slowdown of economic growth in Portugal to the overvaluation of the domestic currency (loss of price competitiveness) when this country joined the Euro zone.

³ The time index t is not attached to the variables for the sake of simplification.

respectively. Additionally, the growth of imports depends on the growth of domestic $\dot{p}$ and foreign $\dot{p}^*$ prices respectively, and the variation of the exchange rate $\dot{e}$ over time⁴.

In the same equation, π represents the elasticity of imports with respect to each of the components of demand. These elasticities are all expected to be positive since all components of demand have import content. In addition, $\delta_m < 0$ is the relative price elasticity of demand for imports with an expected negative sign. A devaluation of the domestic currency is expected to reduce the demand for imports turning them more expensive in domestic market.

The growth of foreign income and the growth of relative prices are conventionally the main determinants explaining the growth of exports, Equation (2), where $\dot{x}$ is the growth of real exports, $\dot{y}^*$ the growth of real foreign income, and $\dot{p}$, $\dot{p}^*$ and $\dot{e}$ as defined before in the import growth equation. It is explicitly assumed that exports competitiveness is based on price and non-price competitiveness captured by the price and income elasticity of the demand for exports, respectively. Specifically, $\varepsilon_x > 0$ is the income elasticity of demand for exports capturing the non-price characteristics of the exported goods associated with quality, design, reliability, varieties, etc⁵. In the same equation $\delta_x > 0$ is the relative price elasticity of export demand with an expected positive sign. A devaluation of the domestic currency is expected to increase the demand for exports turning them more competitive in external markets.

⁴ Exchange rate is defined as the price of foreign currency in terms of domestic currency units. Therefore when e increases shows a currency depreciation of domestic currency.

⁵ Although we assume that the income elasticity of demand for exports captures the quality characteristics of the produced goods we do not neglect the fact that changes in relative prices can be related to changes in relative quality as well.

The aggregate consumption is mainly a function of total disposable income (that includes the yields obtained by holding government bonds) given by Equation (3), where $\dot{c}$ is the growth of consumption, $\dot{y}_d$ the growth of disposable income and $\varepsilon_c > 0$ is the income elasticity of consumption.

Private investment is derived from the accelerator theory⁶ arguing that the growth of gross investment $\dot{i}nv$ is a function of the growth of domestic income $\dot{y}$ and real interest rate $\dot{r}$ as shown in Equation (4). In this equation, $\varepsilon_k > 0$ is the accelerator effect and $\varepsilon_r < 0$ reflects the impact of real cost in financing gross investment.

Our growth model further includes the government sector assuming that the government budget is given by the following identity, in nominal terms:

$$G_n + iB_H + i^* B_F e = tYP + D \quad (5)$$

where G_n is nominal government expenditures, B_H is public debt⁷ owned by home bond holders, B_F is public debt owned by foreign bond holders, Y is domestic income, P is the domestic price level, D the public deficit, i and i^* are nominal interest rates paid to home and foreign public debt holders, respectively, e the nominal exchange rate, and t is the tax rate on nominal income. According to this relation, public deficit exists when total current expenditures (including interest payments on public debt) exceed the revenues obtained through taxes on domestic money income, i.e., $G_n + iB_H + i^* B_F e > tYP$.

⁶ For more details on the original specification of the investment function see Goodwin (1951) and Chenery (1952).

⁷ Public debt is originated by issuing government bonds to finance public deficit.

As it is shown in Soukiazis et al. (2012a) (see *Appendix A*, Equation A.5), the long term relationship of the growth of real government expenditures $\dot{g}$ is given by:

$$\dot{g} = \frac{t\dot{y}}{w_G} + (\dot{d} - \dot{p}) \frac{w_D}{w_G} - \left[\Delta i + i(\dot{b}_H - \dot{p}) \right] \frac{w_{BH}}{w_G} - \left[(e\Delta i^* + i^* \Delta e) + i^* e(\dot{b}_F - \dot{p}) \right] \frac{w_{BF}}{w_G} \quad (6)$$

where $w_D = \frac{D}{YP}$ is the budget deficit ratio, $w_G = \frac{G}{Y}$ is the government spending ratio,

$w_{BH} = \frac{B_H}{PY}$ and $w_{BF} = \frac{B_F}{PY}$ are the shares of public debt owned by home and foreign

bond holders (as a percentage of nominal income), respectively, $\dot{d}$ is the growth of budget deficit and $\dot{b}_H$ and $\dot{b}_F$ are the growth rates of the public debt owned by home and foreign bond holders, respectively.

The last relation of our growth model is an external equilibrium condition given by the following identity:

$$XP + D_F e - i^* B_F e = MP^* e \quad (7)$$

The left hand side of the identity shows the money resources available to finance imports (export revenues plus the amount of public deficit assets hold by foreigners minus interest rate payments on foreign bond holders).

As it is shown in Soukiazis et al. (2012a) (see *Appendix B*, Equation (B.6)) the balance of payments final relation can be expressed as:

$$\dot{x} + \dot{p} + (1 - \xi) \frac{w_D}{w_X} (\dot{p} + \dot{y} - i^*) - (1 - \xi) \frac{w_B}{w_X} \Delta i^* = \frac{w_M}{w_X} \frac{P^* e}{P} (\dot{m} + \dot{p}^* + \dot{e}) \quad (8)$$

where $\dot{x}, \dot{m}, \dot{p}, \dot{p}^*, \dot{y}$ and $\dot{e}$ are growth rates of exports, imports, domestic prices, foreign prices, domestic income and nominal exchange rate, respectively. Additionally, w_D, w_B, w_M and w_X are the ratios of budget deficit, public debt, imports and exports on income, respectively. Finally $(1 - \xi)$ represents the percentage of public deficit (or debt) which is financed by external markets.

Following a similar procedure as in Soukiazis et al. (2012a) (see *Appendix C*, Equation (C.4)) the growth rate of domestic income is given by the following relation:

$$\dot{y} = \frac{A}{B}$$

where

$$A = \left[\begin{aligned} & \left(\varepsilon_x - \frac{w_M}{w_X} \left(\frac{P^* e}{P} \right) \pi_x \varepsilon_x \right) \dot{y}^* + \left(\delta_x \left(1 - \frac{P^* e}{P} \frac{w_M}{w_X} \pi_x \right) - \delta_m \frac{w_M}{w_X} \left(\frac{P^* e}{P} \right) \right) (\dot{p}^* + \dot{e} - \dot{p}) + \\ & + \left(\dot{p} - \frac{P^* e}{P} \frac{w_M}{w_X} (\dot{p}^* + \dot{e}) \right) + (1 - \xi) \frac{w_D}{w_X} (\dot{p} - \dot{i}^*) - (1 - \xi) \frac{w_B}{w_X} \Delta i^* - \\ & - \left(\frac{P^* e}{P} \right) \frac{w_M}{w_X} \left\{ \frac{(\Delta i - \Delta \dot{p}) \xi w_B}{(1 - t) + r \xi w_B} (\pi_c \varepsilon_c) + \pi_k \varepsilon_r (\Delta i - \Delta \dot{p}) + \right. \\ & \left. + \pi_g \left[-\Delta i \frac{\xi w_B}{w_6} - \Delta i^* e (1 - \xi) \frac{w_B}{w_G} \right] \right\} \end{aligned} \right]$$

and

(9)

$$B = \frac{w_M}{w_X} \left(\frac{P^* e}{P} \right) \left\{ \pi_c \varepsilon_c + \pi_k \varepsilon_k + \pi_g \left(\frac{t}{w_G} + \frac{w_D}{w_G} - \frac{i \xi w_B}{w_G} - i^* e (1 - \xi) \frac{w_B}{w_G} \right) \right\} - (1 - \xi) \frac{w_D}{w_X}$$

Equation (9) shows that, among other factors, the growth of domestic income is determined by internal and external imbalances, taking also into account the effect of

relative prices. In particular the nominator A is decomposed in various terms: the first term measures the impact of foreign demand on domestic growth, the second term reflects the substitution effect through the movements of relative prices, the third term is the volume effect of trade, and the rest measures the impact of internal imbalances on domestic growth. The denominator captures basically the effect of the disaggregated import elasticities of the components of demand on domestic growth. Equation (9) will be used to explain actual growth in Italy.

3. Testing the model for the Italian economy

Equations (1) to (4) are estimated simultaneously to obtain the elasticities which are needed to compute the reduced form of domestic income growth as it is defined in equation (9). Annual growth rates are used covering the period 1983-2010 to estimate the system of four equations. The definition of the variables and the data sources are explained in Appendix A. *3SLS (Three-Stage Least Squares)* is used as the most efficient method to capture the interrelation between equations and the causal and feedback effects between the core variables of the system. Table B.1 in the Appendix B provides the estimation results where simultaneity is controlled by using instrumental variables. The growth of imports, consumption, investment, and exports are assumed to be endogenous as well as the growth of government expenditures, domestic disposable income, domestic product, real exchange rate and real domestic interest rate. All other variables in the system are assumed exogenous, including some lagged variables, as it is explained in Table B.2.

In general terms the estimation results are quite satisfactory; all elasticities carry their expected signs and are statistically significant with few exceptions. The relative price elasticity is statistically significant in the export equation (at the 1% level) and carries

the correct positive sign but in the import demand equation although is negative is not statistically significant. The value of the relative price elasticities is low in comparison with the income elasticities, confirming the general view in the literature that trade is more sensitive to income than to price changes. The striking fact in the import demand function is the high elasticity of consumption, which exceeds unity ($\pi_c=1.272$) indicating that imports increase more than proportionally with respect to consumption increase. Although the elasticity of imports with respect to exports and investment are also relevant, thus indicating a significant import content in these elements of demand, they are lower in magnitude ($\pi_x=0.439$ and $\pi_k=0.462$ respectively). The elasticity of imports with respect to government spending ($\pi_g=-0.163$) is not statistically significant, revealing an insignificant import content in this element of demand. This could signify an import substitution policy of the government spending giving preference to the domestic goods and services.

Table B.1 also shows that investment and exports are income elastic with respect to domestic and foreign income, respectively ($\varepsilon_k=2.076$ and $\varepsilon_x=2.961$), the former confirming the accelerator principle in the investment function, and the latter showing the high sensitivity of exports relative to external demand (the OECD income growth). Consumption is income inelastic, as expected ($\varepsilon_c=0.704$) but with a sizeable value. Finally, the impact of real interest rate on investment is negative ($\varepsilon_r=-1.178$) as expected but with no statistical significance. Therefore, the accelerator impact is dominant in the investment equation, showing that investment projects are undertaken only when the perspectives on economic growth are fulfilled.

We also regressed each of the equations individually, by 2SLS (see Table B.2 in Appendix B) using the same instruments. The intention was to carry out some

diagnostic tests to justify the robustness of our results. The first is the Sargan statistic, a test of over-identifying restrictions to check the validity of the instruments used in the regressions and that hypothesis is confirmed in all cases. The second is the Pagan-Hall heteroskedasticity test, showing that the hypothesis of homoskedasticity is never rejected. The third test is the Cumby-Huizinga test for autocorrelation and it is confirmed that errors are not first-order autocorrelated in all cases. Finally the Normality hypothesis of residuals is also confirmed except in the investment equation.

Table I below reports the values which are necessary for computing the growth rates of domestic income in Italy. Some are estimated values taken from Table B.1 (Appendix B) others are annual averages over the period considered (see Appendix A for variable definition and data sources). Three growth rates are computed: $\dot{y}_a$ obtained from Equation (9) where internal and external imbalances are considered and relative prices are not neutral; $\dot{y}_b$ determined by the SCA model with relative prices being constant, and $\dot{y}_c$ obtained from Thirlwall's original Law, given by $\dot{y} = \frac{\varepsilon_x \dot{y}^*}{\pi}$. In the latter case, it was necessary to estimate the import demand function $\dot{m} = \pi \dot{y} + \delta_m (\dot{p}^* + \dot{e} - \dot{p})$ by OLS (with robust standard errors) to obtain the aggregate import elasticity with respect to income growth ($\pi=2.847$).

Comparing these different growth rates with the actual average growth in Italy over the period 1983-2010 ($\dot{y}=1.493\%$) the following remarks can be made:

Table I. Computation of the growth rates of domestic income in Italy, 1983-2010.

ε_x	π_x	ε_c	π_c	ε_k	π_k	π_g	ε_r	δ_m
2.961	0.439	0.704	1.272	2.076	0.462	-0.163	-0.177	-0.210
δ_x	t	r	$\dot{p}$	$\dot{y}^*$	w_D	w_G	w_B	ξ_D
0.467	0.429	0.040	0.047	0.027	0.068	0.424	1.033	0.580
ξ_B	w_M	w_X	i	i^*	Δi	Δi^*	e	$\dot{e}$
0.580	0.226	0.235	0.087	0.057	-0.006	-0.002	0.93	0.01
$(\frac{p^* e}{p})$	$\dot{p}^* + \dot{e} - \dot{p}$	$(\Delta i - \Delta \dot{p})$	$\dot{p}^*$	$(\dot{p} - i^*)$				
1.02	-0.002	-0.001	0.031	-0.010				
$\dot{y}_a$	$\dot{y}_b$	$\dot{y}_c$	$\dot{y}$					
3.393	2.205	2.785	1.493					
Internal and external imbalances and relative prices not neutral	Internal and external equilibrium and relative prices neutral SCA model	Thirlwall's Law $\dot{y} = \frac{\varepsilon_x \dot{y}^*}{\pi}$	Actual growth					

Notes: $\varepsilon_x, \pi_x, \varepsilon_c, \pi_c, \varepsilon_k, \pi_k, \pi_g, \varepsilon_r, \delta_m$ and δ_x are taken from Table B.1 (see Appendix B).

$r, t, w_D, w_G, w_B, w_M, w_X, i, i^*, e, \dot{p}$ and $\dot{y}^*$ are annual averages over the period 1983-2010.

ξ_D and $\xi_B = 0.58$ is assumed constant over the whole period.

(i) The growth rate obtained from Thirlwall's Law ($\dot{y}_c$), given by $\dot{y}_c = \frac{\varepsilon_x \dot{y}^*}{\pi}$ overestimates the actual growth achieved in Italy over the period considered, $\dot{y}_c > \dot{y}$, and this should be consistent with the existence of trade surpluses or at least with a balanced trade of goods and services. If we check the figures of the share of exports ($w_X = 0.235$) and imports ($w_M = 0.226$) they are similar, showing that Italy is close to a balanced economy with respect to external trade, and the ratio of the share ($w_X / w_M = 1.04$) is close to one over the whole period⁸. The main conclusion from this comparison is that Thirlwall's Law overpredicts actual growth in Italy, showing that the country has the potentiality to grow faster than actually did.

⁸ The average Current account as a percentage of GDP is -0.46% for the whole period.

(ii) The growth rate computed by the SCA model with relative prices neutral ($\dot{y}_b = 2.205$), also overestimates the actual growth in Italy and leads to the same conclusion as before. Our estimates indicate that Italy has grown slower than the rate consistent with the balance-of-payments equilibrium ($\dot{y} < \dot{y}_b < \dot{y}_c$) and this can be taken as evidence that this country faces supply constraints, restraining the economy from growing faster⁹. In other words Italy's potential growth¹⁰ (without harming the balance-of-payments position) is higher than that actually achieved and the explanation for this slower growth rate can be found on the existence of supply constraints¹¹ that impede the country from growing faster. As it is known, once the economy becomes supply-constrained, demand growth has no effects on the rate of output growth.

(iii) The growth rates computed by Equation (9) that takes into account the internal and external imbalances and relative prices are not neutral give the same insights as the previous cases. In fact the predicted growth rate $\dot{y}_a = 3.393$ is much higher than the actual rate $\dot{y} = 1.493$ achieved in Italy for the whole period considered indicating again that the country is under supply constraints. This computed growth rate is also slightly higher than the rate obtained assuming internal and external equilibrium. Therefore, our extended SCA model - with or without (internal and external) equilibrium – and Thirlwall's Law all agree that Italy has the potentiality to grow faster (without creating balance-of-payments problems), whenever the supply constraints are removed.

⁹ Some previous studies obtained the same result for Italy, for instance Thirlwall (1979; 1982) for the period 1953-1976, McCombie (1985) for 1973-1980, Pattichis (2001) for 1960-1997, and Bagnai (2008) for 1960-2006.

¹⁰ The definition of potential growth is different than that implying full capacity utilization of factors of production. In this text we mean the growth achieved without creating balance-of-payments deficits.

¹¹ The supply restrictions can rely on the lack of production organization, low productivity, labour market rigidities, financial constraints, high bureaucracy, inefficient legislation, state interference, among others. For instance, total factor productivity growth in Italy is declining over time with the average value being 1.7% in 1986-1990, 1.2% in 1991-1995, 0.8% in 1996-2000, 0.3% in 2001-2005, and -0.5% in 2006-2010.

4. A scenario analysis

Some scenarios can be designed in order to detect policies that could help Italy to grow faster, using the SCA model with internal and external imbalances – Equation (9) - for the global period:

(i) Fiscal policy towards a reduction in income taxation. If taxation on income reduces from $t = 43\%$ to 35% (everything else constant) the predicted growth by our model is $\dot{y}_a = 3.32\%$ which is lower than that found in Table I ($\dot{y}_a = 3.39\%$). It seems that a more friendly taxation policy alone is not capable to stimulate higher growth.

(ii) Fiscal discipline by imposing a public deficit of $w_D = 3\%$ and a debt of $w_B = 60\%$ (as percentages of GDP), which are the goals of the Stability and Growth Pact in Europe. Imposing these goals in the SCA model the predicted growth rate for Italy reduces from $\dot{y}_a = 3.393\%$ (see Table I) to 3.109% showing that public budget discipline alone does not help the economy to grow faster.

(iii) Interest rate policy. A monetary policy attempting to reduce domestic interest rates from 8.7% (the prevailing average rate for the whole period) to 5% (implying $\Delta i = -0.037$) or 3% (implying $\Delta i = -0.057$), induces a higher growth (than that of Table I), equivalent to $\dot{y}_a = 3.87\%$ and $\dot{y}_a = 4.18\%$, respectively. On the other hand, if foreign interest rates¹² rise from $i^* = 5.7\%$ (the prevailing average for the whole period) to $i^* = 7\%$ (the rate that forced other peripheral countries like Greece and Portugal to call for the “*troika*” intervention) and thus $\Delta i^* = 0.013$, the predicted growth falls from $\dot{y}_a = 3.39\%$ to $\dot{y}_a = 1.31\%$ which is a drastic drop. It is therefore shown that growth in Italy is more sensitive to changes in external foreign interest rate, due to increase in interest rate payments to serving external debt. Therefore, financing the domestic economy with

¹² In this study we use long term interest rates of the German economy as the benchmark for foreign interest rates.

lower interest rates is a big stimulus to growth. This is an interesting result favouring the ambitious argument of issuing Eurobonds, which will allow member countries to finance their economies at a lower cost.

(iv) The novelty in this model (in comparison to our initial SCA model) is that now we assume that relative prices are not neutral. If we assume that relative prices are constant in the long-term, that is, $\dot{p}^* + \dot{e} - \dot{p} = 0$ and therefore $(P^*e/P) = 1$, $e=1$ and $\dot{e} = 0$ which also implies that $\dot{p} = \dot{p}^* = 0.031$ (the average foreign inflation rate), and replace these values into our model (Equation (9)) the obtained growth rate is $\dot{y}_a = 3.368\%$. Assuming the same conditions but setting the foreign inflation equal to domestic inflation rate $\dot{p} = \dot{p}^* = 0.047$, the obtained domestic growth rate becomes $\dot{y}_a = 3.55\%$. In both cases the result is different from the one found when relative prices are not neutral $\dot{y}_b = 2.205\%$ (see Table I). Therefore relative prices make a considerable difference in the growth pace and when they are ignored the model can under-predict actual growth rate in Italy.

(v) It is interesting to check a scenario where there is a change in the average value of the growth of real relative prices (or real exchange rate) for the whole period from $\dot{p}^* + \dot{e} - \dot{p} = -0.001$ to 0.01 or 0.02 representing a depreciation of domestic currency. In this case it is shown that growth increases to $\dot{y}_a = 3.75\%$ or $\dot{y}_a = 4.06\%$ suggesting that a currency devaluation¹³ could be a stimulus to growth increasing the country's competitiveness in foreign markets.

(vi) Another relevant policy should be to reduce the import sensitivity of exports (export elasticity) from $\pi_x = 0.439$ to 0.35. In this case our model predicts a rise in the

¹³ However, this is not an option for Italy since the country belongs to the euro zone and nominal exchange rates are fixed. Even if devaluation was an option this should be continuous to have permanent growth effects.

growth rate from $\dot{y}_a = 3.393\%$ to $\dot{y}_a = 3.85\%$ and if $\pi_x = 0.30$ the growth rate is even higher, $\dot{y}_a = 4.09\%$. Exports having large import content could be an impediment to growth since the exports' multiplier effects on income are crowded out by higher imports. Reducing the import content of exports is the appropriate policy to achieve higher growth in Italy. We have to notice however, that in a globalized world, what is important is not importing too much in order to produce exports, but ensuring that the transformation of imported components into exports contains enough value-added. In international markets, most exports embody a substantial share of imported components, but in terms of gains it is important that the value (price) of exports embodying imported components is sufficiently higher than the value (price) of those imported components.

(vii) Growth rates in Italy are also sensitive to import contents of the other components of demand like consumption and investment. Reducing the import sensitivity of consumption from $\pi_c = 1.272$ to 1.0 and that of investment from $\pi_k = 0.462$ to 0.40 the predicted growth rate obtained from the SCA model increases from $\dot{y}_a = 3.393\%$ to $\dot{y}_a = 4.24\%$ which is a significant improvement. Therefore, policies aiming at reducing the import dependence of the elements of demand (especially in consumption) can be a good strategy for fostering economic growth in Italy.

(viii) Increasing the share of exports by only one percentage point (from 23% to 24%) the obtained growth is $\dot{y}_a = 3.57\%$, or alternatively reducing the share of imports by only one percentage point (from 22% to 21%) the predicted growth is even higher, of about $\dot{y}_a = 4.04\%$. Therefore changing the structure of the import and export shares is the appropriate way of achieving higher growth in Italy.

These hypothetical scenarios clearly show that the most effective policy to achieve faster growth in Italy is related to the external sector, either through an effort to obtain a positive net trade or to lower the import content of the components of demand. This is in line with the balance-of-payments equilibrium approach supported by Thirlwall's Law. Beside this, financing the economy with lower interest rates is advantageous for higher growth.

5. Concluding remarks

The aim of this study was to develop a more complete growth model in line with Thirlwall's Law that takes into account both internal and external imbalances and assuming that relative prices are not neutral. The important contribution of the extended model is that it distinguishes the import content of aggregate demand and introduces public deficit and debt ratios as determinants of growth. Additionally, the model controls for relative prices movements and this is the main difference from our previous model (the SCA model). The reduced form of the model shows that growth rates can be obtained in three alternative ways: assuming internal and external imbalances and no neutrality in relative prices; assuming internal and external imbalances but neutral relative prices; and lastly the growth rate predicted by Thirlwall's Law. The growth model is tested for the Italian economy over the period 1983-2010 to check its accuracy.

The equations constituting the model are estimated by *3SLS* to control for the endogeneity of the core variables and to obtain consistent estimates. The empirical analysis shows that growth rates obtained by Thirlwall's Law and from our extended model both over predict the average growth rate of the Italian economy over the period

1983-2010. This can be taken as evidence that Italy should grow faster than actually did without harming its balance of payments position and this lack of growth is due to supply constraints.

The scenarios analysis implemented to identify policies that could foster economic growth suggests that strategies aiming at equilibrating external deficits or changing the structure of imports and exports are the most effective for achieving higher growth. Competitive devaluation also acts as a stimulus to growth but this policy is not feasible in the euro zone. Policies designed to achieve better conditions of financing internal imbalances, and reducing the payment costs of public debt are beneficial to growth. To some extent, Italy could benefit from the challenging idea of issuing Eurobonds to finance its public debt in the European market with lower costs.

Appendix A : Description of the variables and data sources

- $\dot{m}_t$ – annual growth rate of real imports - Imports of goods and services at 2000 prices (national currency; annual percentage change).
- $\dot{c}_t$ – annual growth rate of final private consumption - Private final consumption expenditure at 2000 prices (national currency; annual percentage change).
- $\dot{x}_t$ – annual growth rate of real exports - Exports of goods and services at 2000 prices (national currency; annual percentage change).
- $\dot{k}_t$ – annual growth rate of investment - Gross fixed capital formation at 2000 prices (national currency; annual percentage change).
- $\dot{y}_t$ – annual growth rate of real GDP - GDP at 2000 market prices (national currency; annual percentage change).
- $\dot{p}_t$ – annual growth rate of price deflator GDP at market prices (national currency; annual percentage change).
- $\dot{p}_t^*$ – annual growth rate of price deflator GDP at market prices, for the EU-12 (national currency; annual percentage change).
- w_G – share of government's expenditure on GDP - Total expenditure; general government minus interest including flows on swaps and FRAs (% of GDP at market prices; excessive deficit procedure).
- w_D – share of government's deficit on GDP - Net lending (-) or net borrowing (+); general government (% of GDP at market prices; excessive deficit procedure).
- w_B – share of government's debt on GDP - General government consolidated gross debt (% of GDP at market prices; excessive deficit procedure).
- w_M - imports of goods and services at current prices (national accounts) - % of GDP at market prices
- w_X - exports of goods and services at current prices (national accounts) - % of GDP at market prices.
- t – share of government's revenues on GDP - Total current revenue; general government (% of GDP at market prices; excessive deficit procedure).
- i – nominal long-term interest rates (%)
- i^* - nominal long-term interest rates (%) for Germany

Data on $\dot{m}_t$, $\dot{c}_t$, $\dot{x}_t$, $\dot{k}_t$, $\dot{y}_t$, $\dot{p}_t$, $\dot{p}_t^*$, w_G , w_D , w_B , w_M , w_X , t , i and i^* were taken from European Commission (2011).

- $\dot{g}_t$ – annual growth rate of government’s expenditure. Computed by the authors from data on “General government expenditure by function (Millions of euro from 1.1.1999/ECU up to 31.12.1998)” (for 1990 on) and “General government expenditure (Millions of euro from 1.1.1999/ECU up to 31.12.1998)” (till 1989), from Eurostat - <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes> (extracted on 29th February 2012 and 14th January 2011, respectively) and information on $\dot{p}_t$.
- $\dot{y}^*$ - annual growth rate of real foreign income (OECD countries). Computed by the authors using information about “Gross domestic product, GDP per head, US \$, constant prices, constant PPPs, reference year 2005” , from OECD.StatExtracts - <http://stats.oecd.org/> (extracted on 15th December 2011)
- $\dot{y}_d$ - annual growth rate of real disposable income. Computed by the authors using information about “Net national disposable income (national currency, constant prices, national base year)”, from OECD.StatExtracts - <http://stats.oecd.org/> (extracted on 10th March 2012)
- e – nominal effective exchange rate - price of domestic currency in terms of foreign currency - index (2010=100) narrow indices (27 countries). Computed by the authors using monthly data, from the Bank for International Settlements(BIS)- <http://www.bis.org/statistics/eer/index.htm> (extracted on 18th May 2012)
- (P^*e/P) - real effective exchange rate index (2010=100), narrow indices (27 countries). Computed by the authors using monthly data, from the Bank for International Settlements(BIS)- <http://www.bis.org/statistics/eer/index.htm> (extracted on 18th May 2012)

Appendix B

Table B.1. The 3SLS estimation of the structural growth model: Italy 1983-2010.

	Coefficient	Std Error	t-stat	p-value	R ²	F-stat	p-value
Imports growth							
constant	0.829	0.836	0.99	0.324			
$\dot{c}_t$	1.272	0.455	2.80	0.006***			
$\dot{g}_t$	-0.163	0.114	-1.43	0.156	0.8404	28.03	0.000
$\dot{x}_t$	0.439	0.130	3.39	0.001***			
$\dot{k}_t$	0.462	0.231	2.00	0.049**			
$(\dot{p}_t^* + \dot{e}_t - \dot{p}_t)$	-0.210	0.193	-1.09	0.279			
Consumption growth							
constant	0.589	0.232	2.54	0.013**	0.6626	58.66	0.000
$\dot{y}_{d,t}$	0.704	0.092	7.66	0.000***			
Investment growth							
constant	-1.662	0.555	-2.99	0.003***			
$\dot{y}_t$	2.076	0.240	8.64	0.000***	0.7373	39.55	0.000
r_t	-0.177	0.308	-0.57	0.568			
Exports growth							
constant	-4.327	1.068	-4.05	0.000***			
$\dot{y}_t^*$	2.961	0.339	8.72	0.000***	0.7528	45.91	0.000
$(\dot{p}_t^* + \dot{e}_t - \dot{p}_t)$	0.467	0.109	4.28	0.000***			

Table B.2. The 2SLS estimation of each equation of the structural model, Italy 1983-2010.

	Coefficient	Std Error	t-stat	p-value	Sargan test	Heteroskedasticity test	AR(1) test	Normality test
Imports growth								
constant	0.841	0.952	0.88	0.387	$\chi^2_{20}=27.334$	$\chi^2_{25}=17.048$	$\chi^2_1=0.899$	$\chi^2_2=5.58$
$\dot{c}_t$	1.378	0.523	2.63	0.015**	p-value=0.1261	p-value=0.8800	p-value=0.3429	p-value=0.062
$\dot{g}_t$	-0.195	0.131	-1.49	0.152				
$\dot{x}_t$	0.438	0.149	2.94	0.008***				
$\dot{k}_t$	0.469	0.266	1.76	0.092*				
$(\dot{p}_t^* + \dot{e}_t - \dot{p}_t)$	-0.261	0.222	-1.18	0.253				
Consumption growth								
constant	0.591	0.243	2.43	0.023**	$\chi^2_{24}=26.830$	$\chi^2_{25}=22.682$	$\chi^2_1=0.194$	$\chi^2_2=2.08$
$\dot{y}_{d,t}$	0.703	0.099	7.12	0.000***	p-value=0.3124	p-value=0.5961	0.6594	p-value=0.354
Investment growth								
constant	-1.691	0.589	-2.87	0.008***	$\chi^2_{23}=26.941$	$\chi^2_{25}=21.660$	$\chi^2_1=3.690$	$\chi^2_2=12.72$
$\dot{y}_t$	2.099	0.256	8.21	0.000***	p-value=0.2585	p-value=0.6553	p-value=0.055	p-value=0.002
$\dot{r}_t$	-0.124	0.336	-0.37	0.716				
Exports growth								
constant	-4.333	1.158	-3.74	0.001***	$\chi^2_{23}=26.429$	$\chi^2_{25}=21.815$	$\chi^2_1=0.020$	$\chi^2_2=1.02$
$\dot{y}_t^*$	2.967	0.372	7.98	0.000***	p-value=0.2810	p-value=0.6464	p-value=0.8863	p-value=0.600
$(\dot{p}_t^* + \dot{e}_t - \dot{p}_t)$	0.511	0.124	4.13	0.000***				

Notes to the tables: Endogenous variables: $\dot{m}_t$; $\dot{c}_t$; $\dot{k}_t$; $\dot{x}_t$; $\dot{g}_t$; $\dot{y}_t$; $\dot{y}_{d,t}$; $\dot{r}_t$; $(\dot{p}_t^* + \dot{e}_t - \dot{p}_t)$ Exogenous variables: t_t , t_{t-1} , i_t , i_{t-1} , $\dot{r}_{t-1}$, $\dot{r}_{t-2}$, $\dot{p}_t$, $\dot{p}_{t-1}^*$, $\dot{p}_{t-2}^*$, $w_{B,t}$, $w_{B,t-1}$, $w_{D,t}$, $w_{D,t-1}$, $w_{G,t}$, $w_{G,t-1}$, $\dot{c}_{t-1}$, $\dot{c}_{t-2}$, $\dot{g}_{t-1}$, $\dot{x}_{t-1}$, $\dot{x}_{t-2}$, $\dot{k}_{t-1}$, $\dot{k}_{t-2}$, $\dot{y}_t^*$, i_t^* , $(\dot{p}_{t-1}^* + \dot{e}_{t-1} - \dot{p}_{t-1})$

*, **, *** Coefficient significant at the 10%, 5% and 1% level, respectively.

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