

Varazdin Development and Entrepreneurship Agency
in cooperation with
University North

Economic and Social Development

9th International Scientific Conference



Editors:

Ilko Vrankic, Goran Kozina and Vladimir Kovsca

Book of Proceedings

Istanbul, 9-10 April 2015

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THE SOURCES OF EXTERNAL IMBALANCES IN THE INTRA-EURO ZONE FROM 1999 - 2008

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ABSTRACT

This paper gives an overview over the insights into the causes of external imbalances in intra - euro zone countries in period after the formation of European Monetary Union (EMU) i.e. inception of the euro, running up to the 2008. The present debt crisis is partly a consequence of rising external imbalances in this period. According to the largely accepted traditional explanations, the deficiencies in international competitiveness in some countries are subject to interest rate convergence in core and periphery EMU countries. In this paper will be exposed the pre – euro period macroeconomic stylized facts used for creating assumptions for the general equilibrium model evolved by Farmer. The two - country one-good overlapping generations model with production, capital accumulation and public debt, with respect to capital – output ratio and under assumption of international capital mobility will show how financial integration deteriorated the net foreign asset positions of initially low-interest rates, the periphery countries. Theoretical findings will be compared with empirical observations and complemented with other explanations, such as “over-optimism”, “expected growth” and explanations that introduce some global, extra – European Union.

Keywords: external imbalance, overlapping generations model, international competitiveness

1. INTRODUCTION

In course of financial integration, after the inception of the euro in 1999, the current account position of euro-zone countries diverge in two opposite directions. While the northern and center euro countries (Austria, Belgium, Finland, Germany, Netherlands, France), accumulated current account surpluses, above in particular Germany, the southern and western periphery countries (Portugal, Ireland, Italy, Greece and Spain) run large current account deficits. Large amounts of capital inflows to southern and western periphery countries raised prices and costs. This thereby led to deficiencies in international competitiveness that can be attributed to interest rate convergence in core and periphery countries. During the process of financial integration and up the outburst of the global crisis the private debt in peripheral countries, used for financing housing investments, increased to huge extent (Pisany-Ferry 2012, Figure 4). The large external deficits are “traditionally explained” by financial integration (Chen et al. 2012, p. 6), but there are some other additional explanations such as “over-optimism”, “expected growth” and explanations that introduce some global, extra – European Union. Fagan and Gaspar (2008) found that the development of intra-EMU external imbalances is attributed to North-South differences in time preference, by using a two-good, two-country

overlapping generations pure exchange model without public debt and under assumption of exogenously given and time-stationary capital endowment. (Fagan and Gaspar 2008, p. 13)

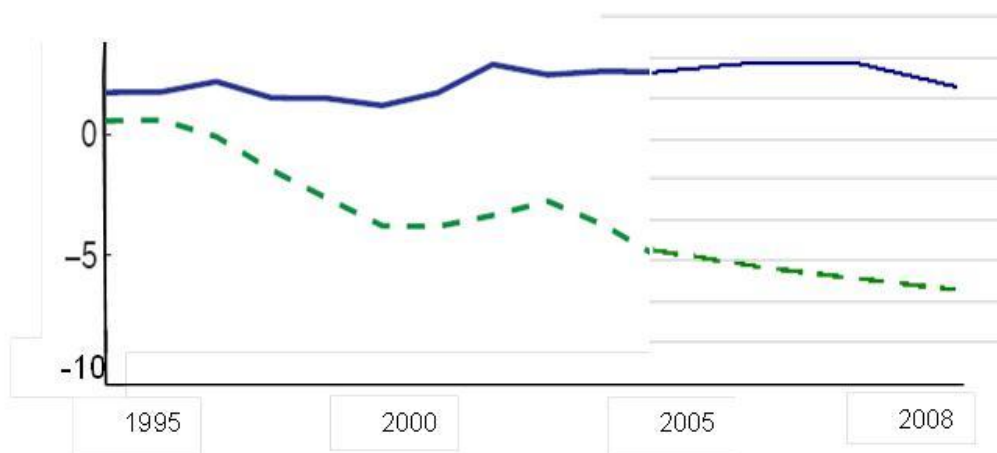
Farmer (2012) evolved the model that respects changing capital – output ratio, mainly due to housing investments, during the process of financial integration. Although there were empirically observed slight upward and onward changes in public debt to GDP ratios across countries, in this model is public debt to GDP ratio assumed as time - stationary for the sake of simplicity (Farmer, 2012, p. 3).

Some other authors emphasize the role of savings-investments balance of individual countries in the current account position, as well. (Giavazzi et Spaventa, 2010, p. 2-3).

2. AN OVERVIEW OVER THE BASIC MACROECONOMIC FACTS IN THE REPRESENTATIVE

In line with Fagan and Gaspar (2008, p. 9), the euro zone countries are separated into two groups based on the criteria of relative interest rates in the late 1990s, i.e. before the euro launch. To the first group, the core countries, belong low interest rate countries: Austria, Belgium, France, Germany and the Netherlands. To the second group, periphery or converging countries, belong the countries which had relatively high interest rates before the introduction of the euro: Portugal, Ireland, Italy, Greece and Spain.

While there was a large differential in interest rates, both nominal and real, between core and periphery countries in the pre - euro period (before 1999), this differential has been annulled after the inception of the euro (Fagan and Gaspar 2008, p. 10). Since the differences in the GDP growth have not been changing significantly through financial integration, it leads us to conclusion that the interest rate convergence between euro core and periphery did not have significant impacts on GDP growth differentials (Farmer, 2012, p. 6). The personal savings ratio is continuously and significantly lower in the periphery, especially in the period between 2005 and 2008. While the housing investment (as percentage of GDP) increased to the large extent in the periphery, especially after 2000, it declined in the euro core in the same period (Farmer, p. 2012, p. 7). Such rise of private expenditures, with no adequate rise of output, resulted in net debtor positions. In the same period, euro core countries run current account balance (or surplus) and net foreign creditor position (Figure 1). Finally, the southern hourly labor compensation in manufacturing rose quicker than northern hourly compensation or more precisely: the ratio of southern to northern hourly labor compensation increased from 55% in 1998 towards 63.5% in 2008. (Farmer, p. 2012, p. 8).



Legend: -- periphery, — core. Source: Fagan and Gaspar (2008, p. 35) and IMF World Economic Outlook Database 2008

*Figure 1: Current account balances (as percent of GDP) in euro periphery and core
1995-2008*

3. IMPACT OF FINANCIAL INTEGRATION ON THE INTRA-EURO ZONE EXTERNAL IMBALANCES EXPLAINED THROUGH THE ONE -COMMODITY, TWO- COUNTRY OLG MODEL

In order to deal with the effects of the (housing) capital-output dynamics on the external balances through financial integration, Farmer (2012) developed a model on the base of a one-good, two-country overlapping generations' (OLG) model with production, capital accumulation and public debt in line with Diamond (1965) and Buiter (1981).

The definition of the real exchange rate was taken over from Lin (1994) and Lundquist (1988), as the ratio of southern to northern (real) wages.

3.1. Basic Model

The Allais – Samuelson – Diamond's two - country one-good Overlapping Generations Model (Blanchard and Fisher, p. 91) with production, capital accumulation and public debt, with its general assumptions is taken as the basic model.

Model assumes two different groups of countries: South, which represents reduction of peripheral Euro - zone, poorer or catching – up countries, and North, which represents reduction of core Euro-zone, richer countries. For purpose of production, there are in every period $t = 1, 2, \dots$ labor services N_t (N_t^*) and capital services K_t (K_t^*) employed. Production function is given by Cobb-Douglas (CD) production function: $M(a_t N_t)^{1-\alpha} (K_t)^\alpha$ ($M^*(a_t N_t^*)^{1-\alpha^*} (K_t^*)^{\alpha^*}$) to produce southern (northern) aggregate output Y_t (Y_t^*), where $M > 0$ ($M^* > 0$) denotes total factor productivity in South (North), a_t denotes the common labor productivity and α (α^*) with $0 < \alpha < 1$ ($0 < \alpha^* < 1$) denotes the capital production share in South (North).

One-period profit maximization by firms in South (North) implies the following FOCs:

$$w_t = (1 - \alpha) M a_t \left(\frac{K_t}{a_t N_t} \right)^\alpha, \quad (w_t^* = (1 - \alpha^*) M^* a_t \left(\frac{K_t^*}{a_t N_t^*} \right)^{\alpha^*}) \quad (1)$$

$$q_t = \alpha M \left(\frac{K_t}{a_t N_t} \right)^{\alpha-1}, \quad (q_t^* = \alpha^* M^* \left(\frac{K_t^*}{a_t N_t^*} \right)^{\alpha^*-1}) \quad (2)$$

whereby w_t (w_t^*) denotes *the real wage rate* in South (North) and q_t (q_t^*) denotes *the real unit capital user costs* in South (North).

Two generations of homogeneous individuals overlap in each period t . At the beginning of period t , a new generation of size L_t (L_t^*) enters the economy in South (North), whereby is it assumed $L_t = L_t^*$ for all $t = 1, 2, \dots$. It is also assumed that the growth factors of northern and southern populations are identical and equal to G^L . Due to empirical findings regarding (-rather similar-) GDP growth rates in southern and northern euro zone countries (as shown in figure 4 above) it is assumed $G^a = G^{a^*}$, $G^n = G^{n^*}$, whereby G^a (G^{a^*}) denotes the respective growth factors of labor productivities in South (North), and G^n (G^{n^*}) denotes the natural growth factors in South (North) and $G^n = G^a G^L$.

Each generation lives for two periods, working during the first when young (denoted by superscript 1), and retiring in the second when old (denoted by superscript 2).

In order to isolate the impact of the common currency in 1999 and to put it into the intertemporal general equilibrium model, following Gourinchas and Jeanne (2006), and Fagan and Gaspar (2008), it is assumed the existence of a) financial autarky of both countries, South and North, before the inception of the common currency, and b) financial integration, in period after launching the euro.

3.2. Intertemporal Equilibrium under Financial Autarky

In order to make the way of building the model of pre-euro situation as financial autarky simpler, some empirical facts will be taken as assumptions: 1. *large real interest rate differences* between core and peripheral countries, for the benefit of core countries; 2. non large current account deficits in southern countries – that is why we will assume that both *the current account and the net foreign asset position* of South and North were zero; 3. small differences in debt to GDP ratio between core and peripheral countries – that is why we will assume that *the government debt to GDP ratios*, b , in South and North remain constant over time; 4. *the personal savings ratio*, σ in South was persistently lower than in euro zone core countries (North). Further, as reference with differential development of labor compensations costs across euro-zone core and periphery, respective differences in southern and northern production technologies will be assumed (Farmer: 2012, p. 12).

Steady-state intertemporal equilibrium for the capital output ratio

A steady-state intertemporal equilibrium for the capital output ratio $v_{t+1} = v_t = v$ ($v_{t+1}^* = v_t^* = v^*$) is:

$$v^2 + \frac{G^n b - \beta(1 - \alpha - \gamma)}{G^n(1 + \beta)} v + \frac{\alpha \beta b}{G^n(1 + \beta)} = 0 \quad ((v^*)^2 + \frac{G^n b^* - \beta^*(1 - \alpha^* - \gamma^*)}{G^n(1 + \beta^*)} v^* + \frac{\alpha^* \beta^* b^*}{G^n(1 + \beta^*)} = 0)$$

The relatively high capital production share α and the low savings rate σ in South imply under financial autarky that the steady-state capital output ratio v in South is lower than in North, and it is attributed to the higher real interest i and a relatively low real wage rate w i.e.: if $\alpha > \alpha^*$, $\gamma > \gamma^*$ and $\sigma < \sigma^*$, then $v_2 < v_2^*$ implying $i > i^*$ and $w < w^*$. For the sake of simplicity is taken that $b^* = b$ and $b < \bar{b}$. Comparing assumptions of the conclusion regarding capital production share α , savings rate σ and government expenditure share γ , with empirical findings with respect to northern and southern candidate countries for EMU in the late 1990s, it will lead us to the following: a) $\alpha > \alpha^*$ is empirically warranted, since the southern European countries were (are) less developed (lower GDP per capita) than the northern European countries and the existence of empirical examples for the fact that the capital production share is higher in catching-up than in advanced countries (Bai and Quian: 2010); b) $b^* = b$ is not empirically warranted (Lane 2012, p. 51), but the reality closer assumption $b > b^*$ would enforce the claim in the last conclusion; c) $\gamma > \gamma^*$ is not empirically warranted for less developed countries; in fact, highly developed countries exhibit larger expenditure shares than less developed countries. If we observe Italy as large-economy, which belongs to the southern bloc, the assumption $\gamma^* = \gamma$ remains relevant; d) $\sigma < \sigma^*$ is empirically warranted. Last conclusion is intuitively plausible. A low savings rate and a relatively high capital income share (corresponding to a relatively low labor income share associated with low per capita savings) drive the capital output ratio down to ensure asset market clearing. Moreover, due to decreasing marginal productivity of capital, the lower capital output ratio is associated with a higher interest rate and a lower real wage rate. (Farmer, 2012, p. 17)

3.3. International Equilibrium under Financial Integration

In order to mimic financial integration after the formation of the EMU, it is taken as assumption that both physical capital (that is mainly accumulated by housing investment, in accordance with empirical finding) and government bonds can be freely traded across both countries without incurring any transaction costs - in line with Buiter (1981) and Lin (1994). Since the interest rate are higher in South, northern younger households will use their savings to invest in southern physical capital and buy the bonds emitted by the southern government until the southern real interest rate declines as much as there is no longer an incentive to shift northern savings towards the South.

It is assumed that domestic and foreign real capital as well as domestic bonds and foreign bonds are perfect substitutes.

The intertemporal equilibrium capital output ratio dynamics

From the national Fisher equation and the international Fisher equation, the following relationship between northern and southern capital output ratios can be derived as follows:

$$v_{t+1}^* = \frac{\alpha^*}{\alpha} v_{t+1}.$$

whereby the v_{t+1}^* denotes the northern capital output ratio at the beginning of period (t+1), v_{t+1} denotes the southern capital output ratio at the beginning of period (t+1), α^* the northern capital production share and α the southern capital production share.

The intertemporal equilibrium capital-output ratio dynamics of the one-good, two-country OLG model under financial integration:

$$\begin{aligned} v_{t+1}^{1/(1-\alpha)} + \left(\frac{\alpha^*}{\alpha} \right) \mu v_{t+1}^{1/(1-\alpha^*)} + b(1-\sigma) v_{t+1}^{\alpha/(1-\alpha)} + b^*(1-\sigma^*) \mu (v_{t+1})^{\alpha^*/(1-\alpha^*)} \\ = \frac{\sigma}{G^n} [(1-\alpha-\gamma) - \frac{\alpha b}{v_t}] (v_t)^{\alpha/(1-\alpha)} + \frac{\sigma^*}{G^n} [(1-\alpha^*-\gamma^*) - \frac{\alpha^* b^*}{v_t^*}] \mu v_t^{\alpha^*/(1-\alpha^*)}. \end{aligned} \quad (3)$$

Hence, the union-wide real interest rate, i , southern and northern real wage rates, w , and thereal exchange rate between South and North, e_t , are attributed to the motion of the capital output ratio. The real exchange rate is defined in line with Lundquist (1988) and Lin (1994) as follows: $e_t = w_t / w_t^*$.

$$i_{t+1} = \frac{\alpha}{v_{t+1}} - 1, \quad w_{t+1} = (1-\alpha) a_{t+1} M^{1/(1-\alpha)} (v_{t+1})^{\alpha/(1-\alpha)} \quad (4)$$

$$\begin{aligned} w_{t+1}^* &= (1-\alpha^*) a_{t+1} (M^*)^{1/(1-\alpha^*)} \left(\frac{\alpha^*}{\alpha} \right)^{\alpha^*/(1-\alpha^*)} (v_{t+1})^{\alpha^*/(1-\alpha^*)} \\ e_{t+1} &= \frac{(1-\alpha) a_{t+1} M^{1/(1-\alpha)} (v_{t+1})^{\alpha/(1-\alpha)}}{(1-\alpha^*) a_{t+1} (M^*)^{1/(1-\alpha^*)} \left(\frac{\alpha^*}{\alpha} \right)^{\alpha^*/(1-\alpha^*)} (v_{t+1})^{\alpha^*/(1-\alpha^*)}} \\ &= \frac{(1-\alpha) M^{1/(1-\alpha)}}{(1-\alpha^*) (M^*)^{1/(1-\alpha^*)} \left(\frac{\alpha^*}{\alpha} \right)^{\alpha^*/(1-\alpha^*)}} (v_{t+1})^{\frac{\alpha-\alpha^*}{(1-\alpha^*)(1-\alpha)}} \end{aligned} \quad (5)$$

From (4) and (5), and under assumption $\alpha > \alpha^*$, it can be easily seen that:

- a) the common real interest rate, i , declines with rising capital output ratio in South,

- b) both the southern and the northern real wage rates, w , increase with rising capital output ratio in South (North), and
- c) the real exchange rate of South, e_t , increases with rising southern capital output ratio.

3.4. Financial autarky vs. financial integration

Definition of a steady state intertemporal equilibrium of the capital output ratio under financial integration is : $v_{t+1} = v_t = v$, $v_{t+1}^* = v_t^* = v^*$, $e_{t+1} = e_t = e$, $i_{t+1} = i_t = i$, $w_{t+1} = w_t = w$, $w_{t+1}^* = w_t^* = w^*$.

The relationship between northern and southern capital output ratios: $v^* = \frac{\alpha^*}{\alpha} v$ (6)

and the intertemporal equilibrium capital-output ratio dynamics of the one-good, two-country OLG model under financial integration:

$$\frac{\sigma}{G^n} \left(1 - \alpha - \gamma - \frac{\alpha b}{v} \right) - [v + b(1 - \sigma)] = - \left\{ \left[\frac{\sigma^*}{G^n} \left(1 - \alpha^* - \gamma^* - \frac{\alpha^* b^*}{v} \right) \right] - \left[\left(\frac{\alpha^*}{\alpha} \right) v + b^* (1 - \sigma^*) \right] \right\} \mu v^\chi, \quad (7)$$

$$\text{or} \quad \phi = -\frac{Y^*}{Y} \phi^* = -\mu v^\chi \phi^*, \quad (8)$$

whereby $\phi_{t+1} \equiv \Phi_{t+1}/Y_{t+1}$ ($\phi_{t+1}^* \equiv \Phi_{t+1}^*/Y_{t+1}^*$) denote the net foreign asset position per output unit of South (North) in period $(t+1)$. The (7) and (8) claim that in a steady state the southern net foreign asset position exactly equals negative position of northern net foreign assets multiplied by the northern to southern GDP ratio.

While financial autarky implies both net foreign asset positions equal to zero and the real interest rate in South higher than in North, financial integration implies a *negative* southern and a *positive* northern net foreign asset position (Farmer, 2012, p. 23).

By the assumptions that the southern financial autarky interest rate, i , is larger than the northern financial autarky interest rate, i^* , after financial integration, the ratio of the net foreign asset position to GDP of South (North) is negative (positive), i.e. $\phi < 0$ ($\phi > 0$).

If $i > i^*$, then holds $1 + i = \alpha/v > 1 + i^* = \alpha^*/v^*$, which lead us to conclusion that decline of i_t (southern interest rate) is associated with rise of v (capital output ratio) in financial integration, which is explained through the decreasing marginal productivity of capital (the opposite case holds for the North).

Differentiating $\phi(v)$ (from the definition of the southern net foreign asset position $\phi(v) \equiv \sigma/G^n (1 - \alpha - \gamma - \alpha b/v) - [v + b(1 - \sigma)]$) with respect to v , we obtain $\phi'(v) = \alpha \sigma b / G^n v^2 - 1$. $\phi'(v_2) < 0$ occurs in the neighborhood of the southern autarky steady state with the larger capital intensity (K_t / A_t).

Hence, the southern net foreign asset position deteriorates with rising southern capital output ratio. According to equation (6) or (7), the northern net foreign asset position is positive after financial integration. ■

If we evaluate equations (4) for the non-trivial steady state, it can be easily seen that the common real interest rate is *lower* than southern autarkic real interest rate and that the southern real wage rate is *higher* and the northern real wage rate is *lower* than the autarkic values.

By the assumption $\alpha > \alpha^*$, the southern real exchange rate rises after the beginning of the process of financial integration. If we evaluate equation (5) in the steady state, and using the definition of real exchange rate of Lundquist (1988) and Lin (1994) ($e_t = w_t/w_t^*$), it is obvious the positive relationship between the real exchange rate and southern capital output ratio, by $\alpha > \alpha^*$. ■

4. EXTERNAL (GLOBAL) INFLUENCES ON EXTERNAL IMBALANCES AND THE ROLE OF EXPECTATIONS

Among financial integration, as a dominant determinant of the external imbalances in intra-euro zone, there are some other factors, empirically and / or intuitively found, that are counted by some authors and that cannot – so far – be put altogether in the theoretic model.

The large current account imbalances of individual intra-euro zone countries are, to a significant extent the consequence of the very asymmetric impact of trade shocks originating outside the euro area, as well as sustained cheap financing from core euro area countries to the largest net debtors. (Chen et al. 2012, p. 4). The factor of essential importance is the entering into the global market and economic rise of China, that negatively affected several southern European countries, causing losses on their international competitiveness – logically, Chinese import demand provided little benefits to the trade balance of these countries. Moreover, the sharp nominal appreciation of the euro contributed to the loss on competitiveness of deficit countries within the euro-zone due to domestic prices and wages. At the same time the rise of China generated huge demand for machinery and equipment goods exported by Germany, while exports from intra-euro zone debtor countries were substituted in their foreign markets by Chinese exports. The same has happened as a consequence of the rise of oil prices: higher income in oil producing countries generated strong demand for machinery and equipment exported by Germany, as well (Chen et al. 2012, p. 4). Empirical findings show that the results for export demand elasticities for goods exported by Greece, Italy, Portugal and Spain are significantly below the euro area average, which proofs the displacement effect on the exports from intra-euro zone countries (Chen et al. 2012, p. 15). The process of international financial integration with elimination of currency risk and the decline in credit constraints and real interest rates, together with over-optimistic expectations of convergence can also lead to increases in domestic prices and unit labor costs that are inconsistent with underlying productivity gains and with the external budget constraint (Chen et al. 2012, p. 8).

Some authors has shown that foreign-financed real estate booms may result in unsustainable growth of non-tradable sectors (Giavazzi and Spaventa, 2010, IMF, 2011). The same authors emphasize the role of relative prices and its impact on capital flows between euro-zone countries and the rest of the world. The relative price movements within the intra-euro zone area, together with trade deficits and associated capital inflows, contributed to the debtor countries' real exchange rate appreciation (Chen et al. 2012, p. 5).

The next stimulating factor was expected growth, i. e. expectation of convergence in the intra-euro zone, that stimulated capital inflows by eliminating currency risk (Chen et al. 2012, p. 7). The "over-optimism" contributed to higher consumption / investment (especially housing) and not corresponding savings ratio. It also contributed to real exchange rate appreciation (Chen et al. 2012, p. 8).

The resulting real exchange rate appreciation contributed to crowding out production and export activities, experiencing low productivity gains and stagnant economic growth, as the competitiveness of tradable goods declined. It logically led to a very significant deterioration of current accounts. Together with rigid labor markets, it leads growing competitiveness differentials among intra-euro zone countries (Chen et al. 2012, p. 8).

5. CONCLUSIVE CONSIDERATION

External imbalances in some intra - euro zone countries in period after the formation of European Monetary Union (EMU) i. e. inception of the euro, running up to the 2008, can be, as diverse theoretic and empirical analysis has shown, attributed to financial integration, “over-optimism”, “expected growth” and explanations that introduce some global, extra – European Union, such as entering of the Republic of China on the global market, increase of oil price etc. Financial integration as a main determinant of external imbalances is “tradional explanation”, that is broadly accepted and empirically indubitable explanation.

The presented model has shown how the decrease of southern interest rate is associated with the rise of capital output ratio after financial integration, which can be explained through the decreasing marginal productivity of capital (rising capital intensity). Moreover, the southern net foreign asset position was deteriorating with rising southern capital output ratio, so the net foreign debtor of southern countries through financial integration can be traced back to the lower savings rate and the larger capital production share in South. High southern real interest rate stimulated northern agents to invest into the southern housing and residential objects, that is why the southern countries turned into the net foreign debtor position. Since the southern real wage rate rose faster than the northern, the real exchange rate appreciate, as it was shown in the model.

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