

Mazier, Jacques; Valdecantos, Sebastian

## Article

# From the European Monetary Union to a euro-bancor: a stock-flow consistent assessment

European Journal of Economics and Economic Policies: Intervention (EJEEP)

## Provided in Cooperation with:

Edward Elgar Publishing

*Suggested Citation:* Mazier, Jacques; Valdecantos, Sebastian (2019) : From the European Monetary Union to a euro-bancor: a stock-flow consistent assessment, European Journal of Economics and Economic Policies: Intervention (EJEEP), ISSN 2052-7772, Edward Elgar Publishing, Cheltenham, Vol. 16, Iss. 1, pp. 8-26,  
<https://doi.org/10.4337/ejeep.2019.0043>

This Version is available at:

<https://hdl.handle.net/10419/277434>

## Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

## Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by/4.0/>

# From the European Monetary Union to a euro–bancor: a stock–flow consistent assessment\*

Jacques Mazier\*\*  
Université Paris-Nord, France

Sebastian Valdecantos\*\*\*  
Universidad Nacional de Mar del Plata, Buenos Aires and Instituto de Altos Estudios Sociales (IDAES),  
Universidad Nacional de San Martín (UNSAM), Argentina

*The crisis of the euro area has questioned the fairness, sustainability and viability of the current setting of the European Monetary Union (EMU). In this article we use a four-country stock–flow consistent (SFC) model in the tradition of Godley/Lavoie (2007a) to examine to what extent an adaptation to Europe of Keynes’s plan of a clearing union with bancor balances could help reduce the imbalances that, at least in part, drove the eurozone into crisis. Our simulation experiments suggest that the implementation of Keynes’s ideas may conduct European countries to a stronger and more sustainable growth cycle.*

**Keywords:** eurozone crisis, TARGET2, bancor, clearing union

**JEL codes:** C63, E12, F33

## 1 INTRODUCTION

The crisis of the euro area has questioned the fairness, sustainability and viability of the current setting of the European Monetary Union (EMU). Since the introduction of the euro in 1999 large current-account imbalances have accumulated. When the global crisis broke out in 2008, and, more specifically, when the sovereign debt crisis in the eurozone started hitting southern countries in 2010, the imbalances suddenly became worrisome, and painful adjustment programmes were applied to restore both external and fiscal balances.

There are different views that explain the order of causation of these imbalances and the role that they may have played in producing the crisis. On one side there is a view based on trade imbalances produced either by the diverging evolution of unit labour costs within the area (Stockhammer 2011; Bibow 2012; Lapavistas 2012), or non-price competitiveness based on superior technological performance and market-guiding industrial policies (Storm/Naas-tepad 2015), these evolutions inducing intra-European exchange-rate misalignments

\* We thank Torsten Niechoj and two anonymous referees for their valuable comments, which helped us improve the content and clarity of our work.

\*\* Email: mazier@univ-paris13.fr.

\*\*\* Email: sebastian@waba.network.

Received 16 November 2017, accepted 22 July 2018

(Duwicquet et al. 2013). There are also those who point out that the pre-crisis deterioration in the current-account balances in southern European countries is a financial phenomenon produced by the excessive liquidity, the low level of real rates of interest in the South and the lack of regulation that characterised the years before the crisis (Constâncio 2014).

These diagnoses reject the mainstream explanation of the crisis, which blames the allegedly profligate behaviour of southern countries. Taking the case of Greece as an example, Nikiforos et al. (2015) have shown that the causality between the external to the fiscal deficit ran from the former to the latter, and not the other way around. According to these authors, ‘the main source of the problem is to be found in the structural characteristics of the EMU’ (ibid.: 303). It is these characteristics (no transfer and no adjustment mechanism to reduce the intra-European imbalances between heterogeneous countries) that cause both the chronic deficits of peripheral countries and the possibility of financing them cheaply with the single currency and the increasingly integrated capital markets. In many respects the current setting of the EMU suffers from the same problem of the European Monetary System (EMS), that is, the way of adjusting internal imbalances is asymmetrical (De Grauwe 2013). Deficit countries alone are obliged to adjust. Wage deflation and restrictive policies have replaced exchange-rate adjustments.

In recent years several proposals for the reform of the euro area have been raised to counter these imbalances and distribute the burden of adjustment more equally between creditor and debtor countries. Among them, the reference to Keynes’s plan imagined during the years that preceded the Bretton Woods conferences seems particularly relevant. What makes the clearing union proposed by Keynes (1941) a useful source of inspiration for the reform of the EMU is the fact that it was designed by Keynes with the view to contrasting the build-up of current-account imbalances and avoiding the contractionary pressures implied by other monetary arrangements (Fantacci 2013). The proposal is especially interesting since, as Cesaratto (2013) and Lavoie (2015) have pointed out, the TARGET2 system that is already in place has many of the features of Keynes’s plan. However, as we will see, some other important points are lacking. The proposal to reform the EMU along the lines of Keynes’s clearing union building on TARGET2 was first advocated by Amato/Fantacci (2014). More recently, Amato et al. (2016) have focused on a simple reform of the TARGET2 system introducing symmetric and increasing charges on positive and negative TARGET2 balances.

In this article we use a four-country stock–flow consistent (SFC) model in the tradition of Godley/Lavoie (2005; 2007a) to examine to what extent an adaptation to Europe of Keynes’s plan of a clearing union with bancor balances could help reduce the imbalances, regardless of their origin. An SFC model seems an appropriate tool to study these proposals since it provides a dynamic framework with a watertight accounting structure that ensures the consistency of the results for both the real and financial variables in stock and flow. In Section 2 we show how each of the exchange-rate regimes that have been in place during recent decades in Europe can be represented with an SFC model. We also show how Keynes’s proposal could be adapted to the current setting of the euro area. In Section 3 we present some simulations aimed at examining the performance of each of the euro–bancor alternatives. Finally, Section 4 concludes.

## 2 ALTERNATIVE CLOSURES: FROM THE EUROPEAN MONETARY SYSTEM TO A EUROPEAN CLEARING UNION

The aim of this section is to represent the different monetary regimes that have characterised the European economy since the beginning of the integration process in the framework of SFC models. The simulation experiments will be helpful, first, to validate the models that

represent the regimes that have already taken place and the outcomes of which are well known. Second, we will be able to assess to what extent the euro–bancor proposal can solve the problems that the historical regimes were not able to deal with.

## 2.1 An SFC modelling approach

Our starting point is Godley/Lavoie (2007a), which presents how the traditional structure of an SFC model can be extended to build a multi-country model. Lately, there has been a growing literature in this field. For instance, Lavoie/Zhao (2010) build a three-country model with fixed and flexible exchange-rate regimes in order to study the effects of reserve diversification. Godley/Lavoie (2007b) use a three-country framework with two exchange rates aimed at modelling the macroeconomic dynamics between two members of the euro area and the United States. Mazier/Tiou-Tagba Aliti (2012) build a three-country model to assess the contribution of potential exchange-rate realignment to the narrowing of global imbalances. Finally, Mazier/Valdecantos (2015) propose a four-country model of the world economy with two European countries (Germany and Spain), the US and the rest of the world to study alternative configurations of the euro area (a euro zone with a global euro and national currencies and a euro zone without Germany). In the remainder of this section, we will use a new version of this model to compare the exchange-rate regimes that have been implemented in the euro area (the EMS and the EMU) with the proposal of a euro–bancor system.

The institutional agents of our model and the financial assets and liabilities that constitute their balance sheets can be found in typical matrices upon which every SFC model is built. The whole structure of the model, except for the behavioural equations, can be derived from these matrices. Since we are not proposing any innovation regarding the behaviour of institutional agents and the general structure of the model, we only give a very brief presentation of its main features.<sup>1</sup>

Each national economy is composed of households, firms, government, commercial banks and a central bank. Spain is representative of the southern European countries while Germany corresponds to the northern ones. Households distribute their wealth ( $V_h$ ) into two types of assets: cash ( $H$ ) and banking deposits ( $M$ ). They earn wages ( $W$ ) and interest ( $r_d M_{-1}$ ) and pay taxes ( $T_h$ ). They follow a traditional consumption function that depends on disposable income and a wealth effect. Firms accumulate fixed capital ( $K$ ) and finance their investment ( $I$ ) through profits ( $P_f$ ) and loans provided by the banks ( $L$ ). The wage share and prices are assumed to be constant. Firms can obtain all the credit demanded without rationing. Commercial banks define the structure of their portfolio according to a Tobinesque equation that states that the demand for each type of bond (domestic and foreign) is a function of its relative return. Banks are required to hold a certain proportion of deposits under the form of reserves ( $R$ ) at the central bank. Banks make profits ( $P_b$ ) out of two sources: interest earnings/payments and valuation effects due to exchange-rate movements. The totality of the banks' profits is transferred to the government in the form of taxes. If, at the end of the day, banks lack the funds to back up the stock of deposits with the required amount of reserves, they can get advances ( $A$ ) from the central bank. The short-term interest rate ( $r$ ) is constant and fixed by the central bank. The long-term interest rate ( $r_b$ ) is also kept constant. The government finances its public expenditures ( $G$ ) and interest payments on its debt ( $r_b B_{-1}$ ) through taxes ( $T$ ) paid by households, firms and banks. In case the financing needs are

1. The complete description of our model can be found in Mazier/Valdecantos (2014).

positive, the government may fill the gap by issuing bonds ( $B$ ).<sup>2</sup> The notation of the financial assets ( $Bd, cb_{SP}^{US}$  for example) is the standard notation used in these models. The superscript ( $US$ ) stands for the country issuing the bond; the subscript ( $SP$ ) stands for the country holding the bond. The subscript ( $d$ ) corresponds to the demand of the bond measured in the currency of the country holding the bond; the subscript ( $s$ ) to the supply measured in the currency of the issuing country ( $Bs, b_{US}^{SP}$  for another example). The last subscripts ( $b$  or  $cb$ ) stand for the institution (commercial bank or central bank) holding the bond. For the sake of simplicity, the size of the four countries is identical. The calibration of the model is very similar to the one used in Mazier/Valdecantos (2014). The differences lie in the equations that had to be modified in order to represent the specific monetary regimes studied in this paper.<sup>3</sup>

## 2.2 The European Monetary System

One of the salient points of the EMS was that national currencies were pegged to the European Currency Unit (ECU), which was a basket currency that only served as a unit of account. Although currencies were allowed to fluctuate slightly around the ECU, the fluctuation bands were insufficient to correct the imbalances that could arise as a result of structural (for instance, the productive structure) and/or temporary (for instance, inflation rates) differences between countries. That is why currency realignments were frequent in this system. For the sake of simplicity, in our model we assume that national currencies (being  $E7$ , the Spanish exchange rate, and  $E8$ , the German exchange rate) are strictly pegged to the ECU, with no fluctuation margin at all. However, if a certain country is persistently accumulating current-account deficits or, more precisely, if its current account is permanently below a certain threshold ' $T$ ', a devaluation of  $\varepsilon$  per cent is introduced. The ECU/US dollar exchange rate ( $E9$ ) is built as a weighted average of the German currency/US dollar exchange rate ( $E1$ ) and the Spanish currency/US dollar exchange rate ( $E2$ ).

$$\frac{1}{E9} = \frac{Y^{GE}}{Y^{GE} + Y^{SP}} \cdot \frac{1}{E1} + \frac{Y^{SP}}{Y^{GE} + Y^{SP}} \cdot \frac{1}{E2} \quad (1)$$

$$E7 = \begin{cases} E7_{-1} & \text{if } CA_{t-i}^{SP} \geq T \quad \text{for all } i = 1, \dots, 5 \\ E7_{-1} \cdot (1 + \varepsilon) & \text{if } CA_{t-i}^{SP} < T \quad \text{for all } i = 1, \dots, 5 \end{cases} \quad (2)$$

$$E8 = \begin{cases} E8_{-1} & \text{if } CA_{t-i}^{GE} \geq T \quad \text{for all } i = 1, \dots, 5 \\ E8_{-1} \cdot (1 + \varepsilon) & \text{if } CA_{t-i}^{GE} < T \quad \text{for all } i = 1, \dots, 5 \end{cases} \quad (3)$$

During the years of the EMS, each national currency used to float against the US dollar and the remaining currencies of the world. Following the Godley/Lavoie (2007a) approach to open-economy SFC modelling, if the nominal exchange rate floats it may be written as the price that clears the domestic bond market (in our case, the Spanish and German bond markets), as equation (4) shows. Then, as the Spanish currency/ECU exchange rate

2. Rather strong assumptions have been made in some cases. More realistic specifications can be found in other papers: credit rationing (Duwicquet/Mazier 2012) and endogenous long-term rate of interest (Duwicquet et al. 2018) in a two-country SFC model of the EMU. These specifications have been omitted in order to keep the model more manageable and focused on the question of the euro-bancor.

3. The value of the parameters used to calibrate the model are available upon request.

( $E7$ ) and the German currency/ECU exchange rate ( $E8$ ) are fixed, the Spanish currency/German currency exchange rate ( $E3$ ) is also fixed and equal to  $E7/E8$  (equation (5)). Consequently, the Spanish currency/US dollar exchange rate ( $E2$ ) can be simply deduced from the German currency/US dollar exchange rate ( $E1$ ) by multiplying it by the Spanish currency/German currency exchange rate ( $E3$ ), as equation (6) shows. The model is working in an asymmetric way as has been *de facto* the case with the German Buba acting as the leading central bank. It may be worth mentioning that, by design, the EMS was meant to be symmetric, with all the central banks stabilising intra-European exchange rates while floating jointly vis-à-vis the US dollar. In practice, the pressure of the markets has always been in favour of the most competitive countries, especially Germany. These countries used the revaluation trend to limit the inflationist pressures. The loan allowed between central banks to face external disequilibria without devaluing appeared insufficient. It was even the case after 1987 with the Nyborg agreements which increased short-term financing of the central banks to defend monetary parities. However, during the crisis of September 1992, the French franc resisted only thanks to the unlimited support of the Bundesbank.

$$E1 = \frac{Bs^{GE} - Bd, b_{GE}^{GE} - Bd, cb_{GE}^{GE} - Bs, b_{RW}^{GE} - Bs, b_{SP}^{GE}}{Bd, b_{US}^{GE}} \quad (4)$$

$$E3 = \frac{E7}{E8} \quad (5)$$

$$E2_t = E1_t \cdot E3_t \quad (6)$$

In a context where countries are engaged in a fixed exchange-rate arrangement, reserve accumulation becomes necessary to avoid both appreciations and depreciations. In this model we assume that reserves are accumulated under the form of bills denominated in US dollars. Following the traditional closure of an SFC model in the context of a fixed exchange rate, reserve accumulation is such that the balance-sheet identity of the central bank holds. This process is reflected for each of the European countries in equations (7) and (8). Since these bonds are denominated in US dollars, when computing the net wealth of each central bank it is required that we express all the assets and liabilities in the same currency. Thus, equations (9) and (10) translate the stock of foreign reserves into domestic currency.

$$\Delta Bs, cb_{SP}^{US} = \frac{\Delta R^{SP} + \Delta H^{SP} - \Delta A^{SP} - \Delta Bd, cb_{SP}^{SP}}{E2} \quad (7)$$

$$\Delta Bs, cb_{GE}^{US} = \frac{\Delta R^{GE} + \Delta H^{GE} - \Delta A^{GE} - \Delta Bd, cb_{GE}^{GE}}{E1} \quad (8)$$

$$\Delta Bd, cb_{SP}^{US} = Bs, cb_{SP-1}^{US} \cdot \Delta E2 + \Delta Bs, cb_{SP}^{US} \cdot E2 \quad (9)$$

$$\Delta Bd, cb_{GE}^{US} = Bs, cb_{GE-1}^{US} \cdot \Delta E1 + \Delta Bs, cb_{GE}^{US} \cdot E1 \quad (10)$$

Once the German bond market has been closed through  $E1$  and the reserve accumulation process has been defined, it is necessary to explain how the Spanish bond market is cleared. Since consistency between exchange rates must be achieved ( $E3 = E7/E8 = E2/E1$ ) the Spanish central bank will make the necessary interventions that ensure that the exchange-rate parities are verified (equation (11)). The German central bank, on the other hand,

does not need to intervene in the domestic bond market since the exchange rate is doing that job. Thus, its stock of domestic bonds is constant (equation (12)).

$$Bd, cb_{SP}^{SP} = Bs^{SP} - Bs, b_{SP}^{SP} - Bs, b_{US}^{SP} - Bs, b_{RW}^{SP} - Bs, b_{GE}^{SP} \quad (11)$$

$$Bd, cb_{GE}^{GE} = \overline{Bd, cb_{GE}^{GE}} \quad (12)$$

### 2.3 The euro and the TARGET2 system

Since a detailed description of the working of the Eurosystem as it is today goes beyond the aim of this paper, we present a closure that incorporates only the essential features of the current institutional setting. Since the ECU has disappeared and the national currencies have been replaced by the euro, the exchange rates  $E7$ ,  $E8$  and  $E9$  are no longer necessary. It should be borne in mind, however, that unlike the ECU, which was only a reference to which national currencies were pegged, the euro is a ‘true’ currency in which real and financial transactions are denominated. Moreover, since there are no more national currencies, all national bonds are denominated in euros. Given that the euro floats freely against the US dollar, the traditional flexible exchange-rate closure could be written in such a way that the euro/US dollar exchange rate clears the euro-denominated bond markets (equation (13)) and that national central banks purchase/sell domestic bonds in such a way that their balance-sheet identities are satisfied (equations (14) and (15)).<sup>4</sup> Since neither Spain nor Germany is engaged in a fixed exchange-rate arrangement, there is no reserve accumulation (equations (16) and (17)); the only possible change in foreign reserves may be due to valuation effects when reserves are expressed in euros (equations (18) and (19)).

$$E1 = E2 = \frac{Bs^{GE} + Bs^{SP} - Bd, b_{GE}^{GE} - Bd, cb_{GE}^{GE} - Bs, b_{RW}^{GE} - Bs, b_{SP}^{GE} - Bd, b_{SP}^{SP} - Bd, cb_{SP}^{SP} - Bs, b_{RW}^{SP} - Bs, b_{GE}^{SP}}{Bd, b_{US}^{GE} + Bd, b_{US}^{SP}} \quad (13)$$

$$\Delta Bs, cb_{SP}^{SP} = \Delta R^{SP} + \Delta H^{SP} - \Delta A^{SP} - \Delta Bd, cb_{SP}^{US} - \Delta TG2^{SP} \quad (14)$$

$$\Delta Bs, cb_{GE}^{GE} = \Delta R^{GE} + \Delta H^{GE} - \Delta A^{GE} - \Delta Bd, cb_{GE}^{US} - \Delta TG2^{GE} \quad (15)$$

$$Bs, cb_{SP}^{US} = \overline{Bs, cb_{SP}^{US}} \quad (16)$$

$$Bs, cb_{GE}^{US} = \overline{Bs, cb_{GE}^{US}} \quad (17)$$

$$\Delta Bd, cb_{SP}^{US} = Bs, cb_{SP-1}^{US} \cdot \Delta E2 + \Delta Bs, cb_{SP}^{US} \cdot E2 \quad (18)$$

$$\Delta Bd, cb_{GE}^{US} = Bs, cb_{GE-1}^{US} \cdot \Delta E1 + \Delta Bs, cb_{GE}^{US} \cdot E1 \quad (19)$$

The balance-sheet identities of the central banks of Spain and Germany have a new component: the TARGET2 balances. These balances arise as a result of real and financial transactions within the Eurosystem and constitute an asset for national central banks

4. These equations suggest that the national central banks intervene in domestic bond markets, which could have been suspected as monetary financing prior to the start of quantitative easing. This has been debated a lot and is not contrary to the rules of the European Central Bank (ECB) (Godley/Lavoie 2007b). The euro government deficits can be financed indirectly by the ECB which is, *de facto*, not different from direct financing.

and a liability for the European Central Bank (ECB). However, this does not imply that in practice a national central bank cannot have a negative stock of TARGET2 balances. As equations (20) and (21) show, the change in TARGET2 balances can simply be defined as the sum of all the intra-European transactions in a given period. In this model the transactions are given by exports, imports, interest payments and portfolio investment. TARGET2 balances algebraically add to zero in this model. The model does not cover the recent negative TARGET2 balances accumulated by the ECB as a consequence of its purchases of extra-eurozone bonds under quantitative easing which are not described in our model.

$$\Delta TG2^{SP} = X_{SP}^{GE} - IM_{SP}^{GE} + r_{-1}^{GE} \cdot Bd, b_{SP-1}^{GE} - r_{-1}^{SP} \cdot Bd, b_{GE-1}^{SP} + \Delta Bs, b_{GE}^{SP} - \Delta Bd, b_{SP}^{GE} \quad (20)$$

$$\Delta TG2^{GE} = X_{GE}^{SP} - IM_{GE}^{SP} + r_{-1}^{SP} \cdot Bd, b_{GE-1}^{SP} - r_{-1}^{GE} \cdot Bd, b_{SP-1}^{GE} + \Delta Bs, b_{SP}^{GE} - \Delta Bd, b_{GE}^{SP} \quad (21)$$

## 2.4 The euro–bancor model

The euro–bancor model takes what we consider to be the most useful features of each of the systems that found implementation in Western Europe during recent decades. First, we borrow from the EMS the existence of a unit of account to which national currencies are pegged. This unit of account currency, which in the EMS was known as the ECU, was called the bancor in Keynes's proposal. In this model, the euro–bancor is determined in the same way as the ECU was determined in the EMS, that is, as a basket currency of national currencies, all measured with respect to the US dollar. It is worth specifying that Keynes's bancor was not a basket of national currencies but a unit of account in which the balances of the national central banks at the International Clearing Union (ICU) were measured. The same choice could have been made in the model without changing the results. Second, in Keynes's proposal countries accumulated bancor balances according to their external performance; whereas those countries that exhibited trade surpluses registered an increase in their bancor account at the ICU, countries running trade deficits registered a decrease in their stock of bancors or increased drawing on their overdraft line. The idea of accumulating balances of the unit of account as a result of international transactions is the same one that we observe in the current TARGET2 system. It implies that most of the institutions that are required to implement a regime of this nature (a clearing union, an international unit of account and a system that registers the transactions within the region) already exist (the ECB could play the role of the ICU and the single euro payments area (SEPA) is the system that registers all the transactions) or have existed and could easily be restored (the ECU could play the role of the bancor).

We first describe the basic closure of the euro–bancor model and then show how other aspects of Keynes's idea can be introduced. As mentioned before, the euro–bancor ( $E9$ ) is a basket currency constituted by European currencies (equation (22)). Unlike Keynes's proposal, where all the countries in the world are engaged in the bancor framework and thus all have fixed, but adjustable, exchange rates, in this case European currencies are pegged to the euro–bancor (and are thereby fixed with respect to each other) but they float against the currencies of the rest of the world. This feature of the system is also borrowed from the EMS. The adjustment criterion of European currencies vis-à-vis the euro–bancor ( $E7$  for Spain and  $E8$  for Germany) depends on the intra-regional external performance of each country (equations (23) and (24)), as the euro–bancor system is concerned by the intra-zone imbalances. It differs from the case of the EMS where the stability of the system was more dependent on the global performance of each country (equations (2) and (3))



and not only on the intra-zone imbalances. The external performance of each country is evaluated, taking a certain sustainability threshold for the bilateral current account, as was proposed by Keynes, with its limitations on the overall balances. The exchange rate of Germany against the US dollar ( $E1$ ) is such that the *ex post* equilibrium in the domestic bond market is ensured (equation (25)). Spain's exchange rate against the dollar follows the movements of the German currency (equation (26)).

This definition of the Spanish exchange rate still entails an asymmetry with respect to the fully symmetric system where all countries' exchange rates are determined in the same manner (as was the case in Keynes's proposal). This asymmetry implies that Spain's currency is not only pegged to the German currency (through their mutual engagement in the euro-bancor system) but also follows the movements of the latter with respect to the dollar. This kind of asymmetry seems to be unavoidable from the time that the institutional setting is such that exchange rates are fixed within a certain area and one of the currencies of the area floats freely against the currency of an extra-regional country, thereby becoming the 'leading currency'. In order for the model to be consistent, only one of the currencies of the euro-bancor system can float freely against an extra-regional currency. This conclusion remains even in the case where the euro-bancor is a simple unit of account and not a basket of national currencies.<sup>5</sup>

In the times of the EMS, the leading currency was the Deutsch mark. The key motivation for the euro was to overcome the EMS asymmetry and its recurrent instability. But, with the lack of any adjustment mechanism to face shocks in heterogeneous countries (except wage deflation and restrictive policies), huge current imbalances have reappeared within the eurozone, to the benefit of Germany. The euro-bancor proposal would allow a reduction of these imbalances thanks to the reintroduction of national currencies and the possibility of exchange-rate adjustments. Like the EMS, the euro-bancor system is symmetric in its principle but would work in an asymmetric way. Germany would remain in a dominant position. The German and Spanish or Italian debts would not be equivalent for the markets. However, this asymmetry would be less pronounced in practice. Germany would not have the power to impose austerity measures in southern countries. As will be explained below, the euro-bancor system would include specific rules which would allow more symmetric adjustments.

As regards the balance-sheet identity of the national central bank of Germany, even though it is engaged in a fixed exchange-rate arrangement, it does not need to accumulate foreign reserves. Since there is no euro-bancor market, the central bank does not need to defend a certain exchange rate. This is one of the advantages of Keynes's proposal: the lack of a need to hoard foreign reserves could prevent potential flows of effective demand from leaking outside the system.<sup>6</sup> Thus, the stock of dollar-denominated bonds held by the German central bank is constant (equation (29)). The situation is different for the central bank of Spain, which has to hoard reserves in order to make the necessary interventions in

5. This is also the case in a model with more than two European countries. For example, if 1 euro-bancor =  $E7 SP = E8 GE = E9 FF$  ( $E7, E8, E9$  fixed but adjustable),  $GE, SP$  and  $FF$  are floating against the dollar,  $\$1 = E1 GE = E2 SP = E3 FF$ .

1 euro-bancor =  $E7/E2 \$ = E8/E1 \$ = E9/E3 \$$

The asymmetry remains. One currency ( $GE$  for instance) is acting as the leading currency and the other currencies follow.  $E2 = E1 (E7/E8)$  and  $E3 = E1 (E9/E8)$ .

6. In Keynes's original proposal, international capital movements were forbidden. In our model, we do not need to do this because we are assuming that the central bank purchases any excess supply of domestic bonds that may result from a sudden capital outflow. This assumption allows us to introduce the bancor proposal without forbidding capital movements, which seems impossible to do in the current context of global financialisation.

the foreign-exchange market that allow its currency to keep the peg against the German currency (equation (28)). When expressed in domestic currency the stock of foreign reserves held by the central bank may be subject to changes due to variations in the exchange rate (equations (30) and (31)).

$$\frac{1}{E9} = \frac{Y^{GE}}{Y^{GE} + Y^{SP}} \cdot \frac{1}{E1} + \frac{Y^{SP}}{Y^{GE} + Y^{SP}} \cdot \frac{1}{E2} \quad (22)$$

$$E7 = \begin{cases} E7_{-1} & \text{if } CA_{GE_{t-i}}^{SP} \geq T \quad \text{for all } i = 1, \dots, 5 \\ E7_{-1} \cdot (1 + \epsilon) & \text{if } CA_{GE_{t-i}}^{SP} < T \quad \text{for all } i = 1, \dots, 5 \end{cases} \quad (23)$$

$$E8 = \begin{cases} E8_{-1} & \text{if } CA_{SP_{t-i}}^{GE} \geq T \quad \text{for all } i = 1, \dots, 5 \\ E8_{-1} \cdot (1 + \epsilon) & \text{if } CA_{SP_{t-i}}^{GE} < T \quad \text{for all } i = 1, \dots, 5 \end{cases} \quad (24)$$

$$E1 = \frac{Bs^{GE} - Bd, b_{GE}^{GE} - Bd, cb_{GE}^{GE} - Bs, b_{RW}^{GE} - Bs, b_{SP}^{GE}}{Bd, b_{US}^{GE}} \quad (25)$$

$$E2 = E1 \frac{E7}{E8} \quad (26)$$

$$E3 = \frac{E7}{E8} = \frac{E2}{E1} \quad (27)$$

$$Bs, cb_{SP}^{US} = \frac{\Delta R^{SP} + \Delta H^{SP} - \Delta A^{SP} - \Delta Bd, cb_{SP}^{SP} - \Delta EB^{SP}}{E2} \quad (28)$$

$$Bs, cb_{GE}^{US} = \overline{Bs, cb_{GE}^{US}} \quad (29)$$

$$\Delta Bd, cb_{SP}^{US} = Bs, cb_{SP-1}^{US} \cdot \Delta E2 + E2 \cdot \Delta Bs, cb_{SP}^{US} \quad (30)$$

$$\Delta Bd, cb_{GE}^{US} = Bs, cb_{GE-1}^{US} \cdot \Delta E1 \quad (31)$$

We have already introduced some of the main features of Keynes's bancor proposal, that is, the existence of an international unit of account and a system that registers all the transactions undertaken within the domain of this institutional arrangement. We can now introduce another key feature of this system: the clearing union. This is the institution where all the payments are cleared. Thus, every country would have an account at the clearing union. This account would be an asset for each national central bank and a liability for the clearing union, just as happens in the current TARGET2 system.<sup>7</sup>

However, unlike the current system, euro-bancor balances would not only be composed of international trade and portfolio investment within Europe, but there would also be some specific flows characterising Keynes's proposal. First, in order to make the external adjustment process (the trend to make all countries' current accounts tend to zero) more

7. *Stricto sensu* the International Clearing Union does not hold an account in its own name but only an account in the name of member countries (positive or negative and adding to zero). This does not differ from what is written in the model. TARGET2 imbalances become a true (joint) liability for the ICU (or remaining members) when a deficit country exits without settling its negative balance.

symmetric than it is today, this system would make both debtor and creditor countries share the burden of the debts. Thus, all countries would pay interest on their bancor balances, should they be positive or negative. This rule should encourage countries to make their accounts at the clearing union be as close to zero as possible, since it would always be better to consume a real good (an import) or buy an income-earning asset than pay interest that entails no consumption at all.

A second flow that must be incorporated into the accumulation of euro-bancor balances is the one related to the distribution of the funds collected by the clearing union, which result precisely from the aforementioned interest payments on euro-bancor balances. We call these flows resulting from the redistribution process ‘intra-European adjustment’ ( $IEA$ ). The sum of all these flows determines the change in the stock of euro-bancors ( $EB$ ) held by each country’s central banks. The sum of all the interest payments on euro-bancor balances determines the profit of the clearing union ( $P^{CU}$ ), which distributes these funds to member countries according to the performance of the current account of each member country. If Spain’s current account with respect to Germany ( $CA_{SP}^{GE}$ ) is below a threshold ( $\theta$ ), Spain will get all the funds/profit of the clearing union. If not, the funds will be shared (equations (35) and (36)). In that sense we have a transfer union from creditor to debtor country. Finally, we ensure that the balance-sheet identity of the central banks of Spain and Germany holds through the purchases/sales of domestic bonds (equations (37) and (38)). The structure of these equations is different because of the asymmetry embedded in the model (whereas Spain needs to hold foreign reserves, Germany does not).

$$\begin{aligned} \Delta EB^{SP} = & X_{SP}^{GE} - IM_{SP}^{GE} + r_{-1}^{GE} \cdot Bd, \quad b_{SP-1}^{GE} - r_{-1}^{SP} \cdot Bd, \quad b_{GE-1}^{SP} \\ & + \Delta Bs, \quad b_{GE}^{SP} - \Delta Bd, \quad b_{SP}^{GE} - |r_{-1}^{EB} \cdot EB_{-1}^{SP}| + IEA^{SP} \cdot E7 \end{aligned} \quad (32)$$

$$\begin{aligned} \Delta EB^{GE} = & X_{GE}^{SP} - IM_{GE}^{SP} + r_{-1}^{SP} \cdot Bd, \quad b_{GE-1}^{SP} - r_{-1}^{GE} \cdot Bd, \quad b_{SP-1}^{GE} \\ & + \Delta Bs, \quad b_{SP}^{GE} - \Delta Bd, \quad b_{GE}^{SP} - |r_{-1}^{EB} \cdot EB_{-1}^{GE}| + IEA^{GE} \cdot E8 \end{aligned} \quad (33)$$

$$P^{CU} = \left| r_{-1}^{EB} \cdot \frac{EB_{-1}^{SP}}{E7} \right| + \left| r_{-1}^{EB} \cdot \frac{EB_{-1}^{GE}}{E8} \right| \quad (34)$$

$$IEA^{SP} = \begin{cases} P^{CU} & \text{if } \frac{CA_{SP}^{GE}/E7}{Y^{SP}/E7} < \theta \\ 0.5 P^{CU} & \text{if } \frac{CA_{SP}^{GE}/E7}{Y^{SP}/E7} \geq \theta \end{cases} \quad (35)$$

$$IEA^{GE} = P^{CU} - IEA^{SP} \quad (36)$$

$$Bd, \quad cb_{SP}^{SP} = Bs^{SP} - Bs, \quad b_{SP}^{SP} - Bs, \quad b_{US}^{SP} - Bs, \quad b_{RW}^{SP} - Bs, \quad b_{GE}^{SP} \quad (37)$$

$$\Delta Bd, \quad cb_{GE}^{GE} = \Delta R^{GE} + \Delta H^{GE} - \Delta A^{GE} - \Delta Bd, \quad cb_{GE}^{US} - \Delta EB^{GE} \quad (38)$$

Another closure implying a real-side adjustment could consist of the utilisation of the flows of redistributed interest by the clearing union to finance the imports of capital goods that increase the stock of capital and eventually change the productive structure

of the economy, thereby increasing competitiveness and, in the long run, reducing the demand of imported goods. This would require the augmentation of Spain and Germany's import equations by the amount of 'intra-European adjustment' flows received from the clearing union (equations (39a) and (40a)). The amount of imported capital goods that results from these flows of 'aid' would be added to the traditional investment function used in many SFC models (equations (41a) and (42a)). As is shown in the simulations presented in the next section, the structural change effect is introduced as a gradual decrease in the income elasticity of imports of the deficit country.

$$\ln(IM_{SP}^{GE}) = \mu_0^{SP} + \mu_1^{SP} \cdot \ln(Y^{SP}) + \mu_2^{SP} \cdot \ln\left(\frac{1}{E3}\right) + \mu_4^{SP} \cdot \ln[1 + IEA^{SP} \cdot E7] \quad (39a)$$

$$\ln(IM_{GE}^{SP}) = \mu_0^{GE} + \mu_1^{GE} \cdot \ln(Y^{GE}) + \mu_2^{GE} \cdot \ln(E3) + \mu_4^{GE} \cdot \ln[1 + IEA^{GE} \cdot E8] \quad (40a)$$

$$\frac{I^{SP}}{K_{-1}^{SP}} = \gamma_0^{SP} + \gamma_1^{SP} \cdot \frac{P^{SP}}{K_{-1}^{SP}} + \gamma_2^{SP} \cdot \frac{r_{-1}^{SP} \cdot L_{-1}^{SP}}{K_{-1}^{SP}} + \gamma_3^{SP} \cdot u_{-1}^{SP} + \mu_4^{SP} \cdot \ln[1 + IEA^{SP} \cdot E7] \quad (41a)$$

$$\frac{I^{GE}}{K_{-1}^{GE}} = \gamma_0^{GE} + \gamma_1^{GE} \cdot \frac{P^{GE}}{K_{-1}^{GE}} + \gamma_2^{GE} \cdot \frac{r_{-1}^{GE} \cdot L_{-1}^{GE}}{K_{-1}^{GE}} + \gamma_3^{GE} \cdot u_{-1}^{GE} + \mu_4^{GE} \cdot \ln[1 + IEA^{GE} \cdot E8] \quad (42a)$$

If the structural change process is satisfactory we would expect to observe that after some periods the deficit country would start being able to substitute imports, thereby reducing the dependence on foreign goods. In order to model this particular scenario we either endogenise the productive structure or we introduce structural change as an exogenous shock that gradually takes place some periods after the country has started to import the capital goods that will contribute to the process of import substitution. For the sake of simplicity, in this model we treat structural change as exogenous.

Finally, there is a last feature that derives from Keynes's proposal that could be introduced. In the previous paragraph we mentioned that in Keynes's proposal countries are encouraged to use their positive bancor balances to increase imports, since otherwise they would be progressively wasting these balances by paying interest on them. This incentive to increase imports can be modelled by expanding the standard import equations. Normally, these equations depend on domestic income and the real exchange rate. In this case, as shown in equations (39b) and (40b), we add an additional term that depends on the burden of the stock of euro-bancors. The intuition behind this term would be that the higher the burden (represented by the interest payments associated with them), the higher the incentive to increase imports. Now, if imports are increased, it needs to be specified what sector is going to purchase this additional flow of goods from abroad. In this model we assume that it is the government, since in principle it is the only agent that could internalise the loss that the central bank would incur if euro-bancor balances were gradually extinguished due to the payment of interest to the clearing union. Thus, we augment the traditional public spending equations, which consider government consumption exogenous, to incorporate this additional flow of imports (equations (41b) and (42b)). It is worth mentioning that, in order to be consistent with Keynes's case for a non-recessionary adjustment process, the import equation is only augmented when euro-bancor balances are positive. This implies that whereas surplus countries are forced to pursue more expansive policies, deficit countries are not forced to undertake a contractionary fiscal policy that restores the long-term balance-of-payments equilibrium through a recession. There is an asymmetry in the adjustment process in favour of reflation.

$$\ln(IM_{SP}^{GE}) = \begin{cases} \mu_0^{SP} + \mu_1^{SP} \cdot \ln(Y^{SP}) + \mu_2^{SP} \cdot \ln\left(\frac{1}{E3}\right) + \mu_3^{SP} \cdot \ln[1 + (r^{eb} \cdot EB_{-1}^{SP})] & \text{if } EB_{-1}^{SP} > 0 \\ \mu_0^{SP} + \mu_1^{SP} \cdot \ln(Y^{SP}) + \mu_2^{SP} \cdot \ln\left(\frac{1}{E3}\right) & \text{if } EB_{-1}^{SP} \leq 0 \end{cases} \quad (39b)$$

$$\ln(IM_{GE}^{SP}) = \begin{cases} \mu_0^{GE} + \mu_1^{GE} \cdot \ln(Y^{GE}) + \mu_2^{GE} \cdot \ln(E3) + \mu_3^{GE} \cdot \ln[1 + (r^{eb} \cdot EB_{-1}^{GE})] & \text{if } EB_{-1}^{GE} > 0 \\ \mu_0^{GE} + \mu_1^{GE} \cdot \ln(Y^{GE}) + \mu_2^{GE} \cdot \ln(E3) & \text{if } EB_{-1}^{GE} \leq 0 \end{cases} \quad (40b)$$

$$G^{SP} = \begin{cases} G_0^{SP} + G_{-1}^{SP} \cdot (1 + \rho) + \mu_3^{SP} \cdot \ln[1 + (r^{eb} \cdot EB_{-1}^{SP})] & \text{if } EB_{-1}^{SP} > 0 \\ G_0^{SP} + G_{-1}^{SP} \cdot (1 + \rho) & \text{if } EB_{-1}^{SP} \leq 0 \end{cases} \quad (41b)$$

$$G^{GE} = \begin{cases} G_0^{GE} + G_{-1}^{GE} \cdot (1 + \rho) + \mu_3^{GE} \cdot \ln[1 + (r^{eb} \cdot EB_{-1}^{GE})] & \text{if } EB_{-1}^{GE} > 0 \\ G_0^{GE} + G_{-1}^{GE} \cdot (1 + \rho) & \text{if } EB_{-1}^{GE} \leq 0 \end{cases} \quad (42b)$$

These equations complete the closure of the euro-bancor model. We are now able to turn to the simulation experiments, in order to assess the advantages and disadvantages that this system may have in comparison to the previous experiences that took place in Europe. It should be noted that some of these proposals for a euro-bancor regime could be implemented within the current institutional setting of the Eurosystem, without a breakup of the euro. Both the interest paid on the euro-bancor balances (currently the TARGET2 balances) and their redistribution through intra-European adjustments (IEA), and the launch of more expansionary policies in the surplus countries, as well as the utilisation of IEA funds to finance supply-side policies improving the non-price competitiveness of southern European countries could be implemented with no major changes in the current setting of the Eurosystem. However, agreement on such proposals requires a strong and unlikely political will.

### 3 SIMULATIONS

#### 3.1 EMS and EMU

Our first challenge is to ‘validate’ our models that represent events that have already happened. Thus, we begin with the EMU scenario. Our experiment consists of an introduction of a competitiveness loss in Spain. Since the introduction of the euro, the negative competitiveness was produced by the unfavourable parities at which southern countries entered the euro (Duwicquet et al. 2013). This can be represented in the model through a sudden increase in the autonomous component of Spain’s imports equation and a decrease in the same component of German imports, both reflecting the effects of the exchange-rate misalignments (overvaluation of the euro for Spain and undervaluation for Germany). Figure 1 presents the impact of this shock on the EMU model and on two versions of the EMS model. The reason why we have two

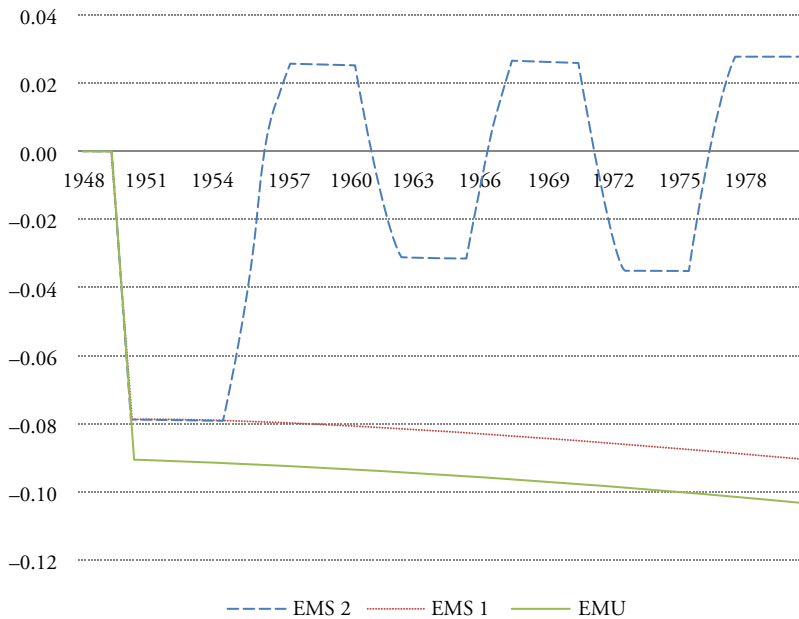


Figure 1 Spain's current account with respect to Germany

versions of the EMS model is given by the fact that we have chosen two different thresholds for the devaluation rule. In the EMS 1 model, the threshold is higher (larger current-account deficits are allowed), in the EMS 2 model the threshold is lower (the size of the current-account deficits that are allowed is smaller).

The EMS 1 model is less volatile than the EMS 2 one because in the EMS 2 model continuous devaluations of Spain and Germany take place. After the initial negative shock on Spain, current-account deficits are accumulated. Since these deficits exceed the threshold (which is set at a lower level than in the EMS 1 model), a devaluation of the Spanish currency is triggered. This brings Spain's current account into surplus, at the expense of Germany, which goes into deficit. After some periods, the German currency devalues for exactly the same reason as the Spanish currency had devaluated before: the size of the current-account deficit is exceeding the predetermined threshold. These dynamics repeat regularly over time. If this cyclical behaviour is not desired, the solution could be to set the threshold at a level that does not trigger these dynamics, as is shown in model EMS 1. However, this may be hard to reach in practice because of the negative impacts that such a high threshold (which allows for relatively large deficits) might have on the domestic level of activity, public finances and debt sustainability. During the years of the EMS the dynamics were closer to the one described in model EMS 2 with frequent exchange-rate adjustments (beginning of the 1980s) and subsequently to the one represented by model EMS 1 with more rigidity (end the 1980s).

In the EMS scenarios, after the initial shock an appreciation of the German currency ( $E1$  decreases) takes place, leading to an appreciation of the ECU ( $E9 = E1/E8$  decreases). The ECU was constructed as a weighted average of the Spanish and German currencies against the US dollar. Since, after the shock, Germany is running a current-account

surplus, its exchange rate against the US dollar appreciates (equation (4)). As long as there is no adjustment between the Spanish and the German currencies, the initial parities are kept constant. Thus, the Spanish currency ends up appreciating as well. Depending on the threshold introduced in the adjustment rule, there will either be continuous devaluations or there will not. What the EMS 1 scenario shows is a paradoxical situation, where Spain runs persistent current-account deficits at the same time as its currency appreciates. As a consequence, Spain accumulates increasing stocks of external debt that eventually have to be paid. Hence, a scenario like EMS 1 does not seem feasible, as it has been illustrated by the burst of the rigid EMS in 1992–1993. Last, GDP falls less in the EMU scenario with respect to EMS 1 but more with respect to EMS 2. The reason for this unequal performance is related to the evolution of the exchange rate with the larger, but more volatile, adjustment of the Spanish currency in EMS 2.

### 3.2 Euro-bancor models

The first euro-bancor model, which we label Eurobancor 1, consists of the introduction of the clearing union and interest-bearing euro-bancor balances. These interests are collected and distributed by the clearing union. The devaluation threshold is lax and is never reached. The second closure, Eurobancor 2, is identical to the previous one but with a stricter threshold on the devaluation rule (meaning that a persistent current-account deficit of 1 per cent is enough to trigger an exchange-rate adjustment), such that after an initial adjustment of the Spanish exchange rate no exchange-rate adjustments take place. The third closure, Eurobancor 3, considers a very strict threshold: no current-account deficits are allowed at all. As a result, a devaluation of the currency of Spain is followed by a devaluation of the German currency, and so forth. The scenario Eurobancor 4 is the one where countries use the ‘aid’ provided by the clearing union (that is, the redistribution of interest by the clearing union) to purchase imported capital goods that in the medium term allow for a higher degree of import substitution. This is represented by assuming that, after five periods of importing capital goods, the country’s income elasticity of imports starts to decrease gradually for ten periods, remaining constant thereafter. We refer to this process as ‘structural change’. Finally, the model Eurobancor 5 introduces the additional terms on the import equations, in an alternative to Eurobancor 4, in order to represent the higher incentive to import that surplus countries may have in this institutional setting. As mentioned before, these imports are computed as part of government consumption. For the Eurobancor 4 and 5 cases we have introduced the lax devaluation threshold, in order to prevent exchange rates from adjusting. This will allow us to study the specific effect of the mechanisms embedded in these two proposals.

Figure 2 represents the reaction of each model to the same competitiveness shock analysed before. The trajectory followed by the bilateral current account of Spain with respect to Germany in model Eurobancor 1 is qualitatively similar to that of the EMS 1 model. This seems reasonable since in neither case are the adjustment mechanisms triggered.

As regards models Eurobancor 2 and 3, the initial trajectories are very similar. After the shock, an initial deterioration in the current account is followed by an immediate improvement, which results from the transfers of the interest that the clearing union collects (recall that in this framework the clearing union collects interest on euro-bancor balances and transfers them to member countries according to their external performance). Since in the periods after the shock it is Spain whose current account is in deficit, the clearing union transfers the totality of the interest to Spain. However, this interest, computed as a credit in Spain’s current account, are not sufficient to bring the current-account

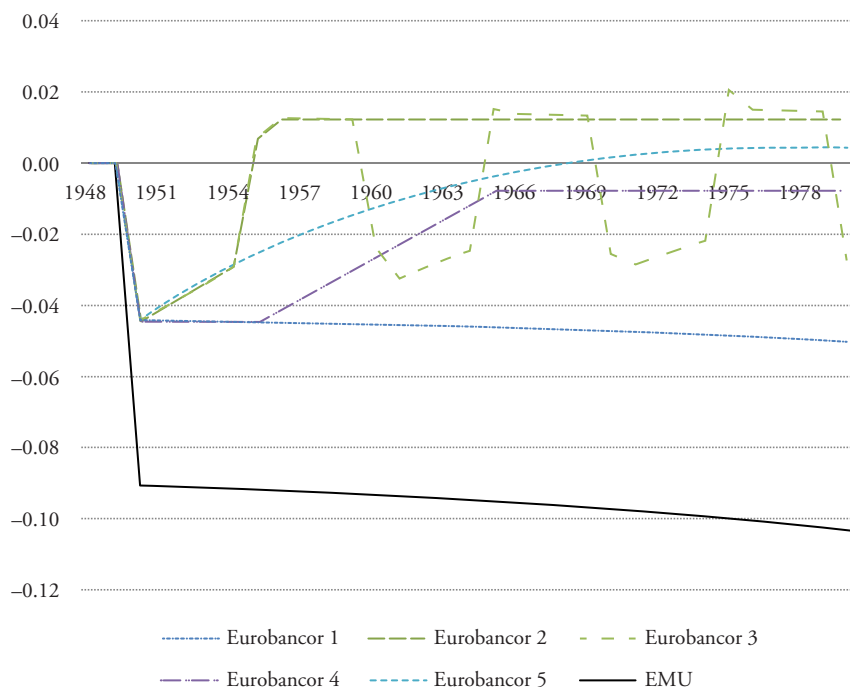


Figure 2 Current account of Spain with respect to Germany

balance above the threshold (neither the stricter nor the laxer one). Thus, the Spanish currency is devalued in period 55. The immediate effect is an increase in the current-account balance, to the extent that it turns into surplus. Hereafter, the trajectories of models Eurobancor 2 and 3 diverge, owing to the effect that the predetermined threshold has on Germany's current account.

In model Eurobancor 3, where the threshold is stricter (only small deficits are tolerated), the devaluation of the Spanish currency and the consequent current-account surplus of Spain turns Germany's current account into deficit, eventually falling below the threshold and triggering an exchange-rate adjustment. This brings the German current account into surplus, at the expense of Spain. From then on, the dynamics are similar to the ones observed in model EMS 2 where one exchange-rate adjustment followed another. We concluded that these dynamics were not desirable. Model Eurobancor 2 shows more stable dynamics for the simple reason that the devaluation threshold is higher. This implies that Germany 'accepts' the current-account deficit with respect to Spain brought about by the devaluation of the Spanish currency and no more exchange-rate adjustments take place.

Finally, models Eurobancor 4 and 5 seem to provide the more stable adjustment processes. In the case of model Eurobancor 4, after the initial shock that brings Spain's current account into deficit, the accumulation of euro-bancor balances and the subsequent redistribution of interest by the clearing union imply an 'aid' to Spain that is used to purchase imported capital goods. This additional flow of imports prevents Spain's current



account from reaching equilibrium in the short run. However, after some periods, the effects of structural change take over and the country starts to substitute imports. This is reflected in the gradual improvement of Spain's current account until it finally reaches a position that is close to equilibrium.

As regards model Eurobancor 5, after the initial shock, the accumulation of positive euro-bancor balances by Germany produces an incentive to increase its purchases of goods from Spain. These imports are purchased by the government. In the long run, this produces a trend to balance the external positions at the same time as potential flows of effective demand do not leak from the system.

Let us take a quick look to the behaviour of the Spanish currency vis-à-vis the US dollar under each of these alternative institutional settings, which can be seen in Figure 3. In the case of the Eurobancor 1, since the monetary arrangement is constrained to the European economy, the exchange rate of the Spanish currency vis-à-vis the dollar floats, replicating the movement of the German currency vis-à-vis the dollar (equation (26)). Even though the shock has a positive impact for Germany's current account, its currency registers a slight depreciation. With the euro-bancor system, the country in deficit (*SP*) benefits from a redistribution process through the intra-European adjustments (*IEA*) which are paid by the clearing union (equations (35) and (36)) but are equivalent *in fine* to transfers from the surplus country government (*GE*) to the deficit one (through the taxes paid by the central banks to their governments). Consequently, the issue of German bonds increases while the issue of Spanish bonds decreases. This implies a depreciation of the German currency (equation (25)) and also of the Spanish one (equation (26)). This depreciation is amplified by the fact that the accumulation of euro-bancor balances by the German central bank implies the sale of government bonds

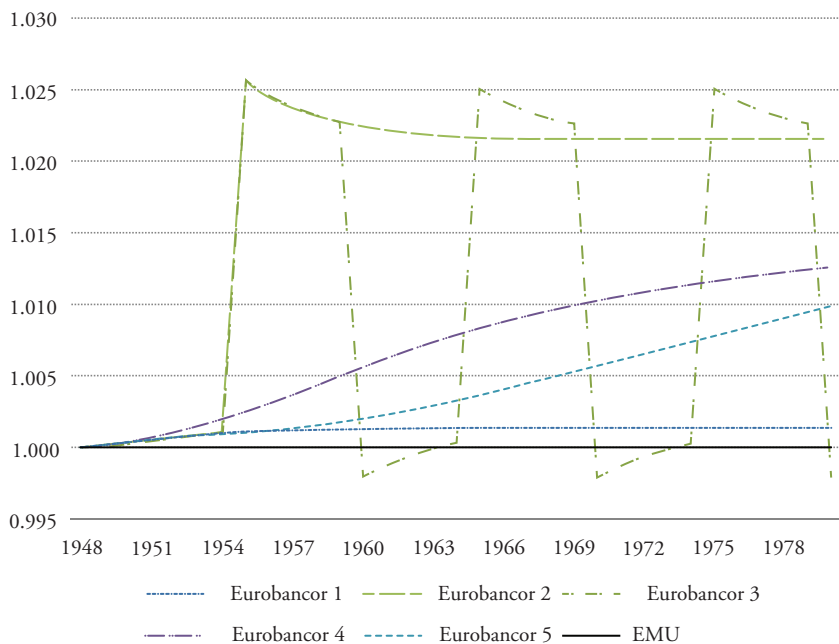


Figure 3 Spain's currency versus the US dollar

(recall equation (38)).<sup>8</sup> Since the Spanish currency replicates this trajectory, the short-run impact of the shock is a slight depreciation with respect to the dollar.

The cases of Eurobancor 2 and 3 are identical to Eurobancor 1 until a first adjustment in the exchange rate of the Spanish currency against the euro–bancor takes place, in period 55. When this happens, the current account reverses its sign, thereby producing an appreciation. As the trade surplus boosts economic growth (Figure 4), imports increase further. This not only erodes the new trade surplus but also produces a pressure on the exchange rate towards depreciation of the Spanish currency. From then on, it is observed that whereas the exchange rate remains stable in Eurobancor 2, it starts fluctuating in Eurobancor 3.

The cases of Eurobancor 4 and 5 exhibit a larger depreciation with respect to the Eurobancor 1 scenario. The stimuli embedded in these proposals imply a higher level of activity with respect to the previous cases, where only exchange-rate adjustments or flows of ‘aid’ were coming into play. This higher GDP growth also implies a higher level of endogenously created liquidity in each domestic monetary system and banks require more advances from the central bank. The central bank of Germany absorbs the excess liquidity by selling domestic bonds. This sale of domestic bonds produces an excess supply of German bonds that is adjusted through an upward movement of the German currency (and of the Spanish one) with respect to the dollar. This devaluation

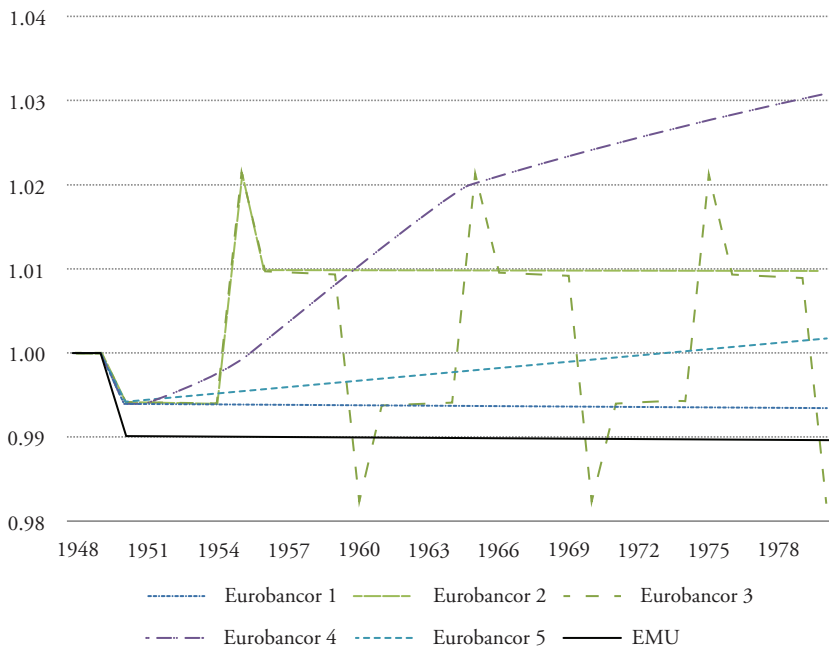


Figure 4 Spain's GDP

8. It should be noted that this accumulation of euro–bancor balances differs from the actual euro events. Following the emergency policy of the ECB to rescue the deficit country banks, German external claims moved from German banks' balance sheets to the German central bank balance sheet in the form of TARGET2, but the Bundesbank has not been selling anything.

of the German and Spanish currencies could be less pronounced if greater adjustment in the German central bank's repo auctions had occurred rather than bond market interventions.

As has been explained previously, some of the euro-bancor regimes could be compatible with the current institutional setting of the Eurosystem. It is the case when, as a result of a lax devaluation threshold, no exchange-rate adjustment is triggered. The Eurobancor 1 model, based on intra-European transfers, is the simplest one. Compared with the current euro system (EMU), it allows an improvement of the performances of the southern European countries in terms of growth and the current account, with a slight negative impact on the German growth rate. This moderate slowdown must be relativised. German growth cannot be supported by running up rising trade surpluses forever, as partners will go bust at some point. The Eurobancor 4 and 5 models, based on increasing investment and improvement of non-price competitiveness in Spain, as well as on more expansionary policies in Germany, would benefit both countries. However the current political context in the eurozone suggests that it would be difficult to promote such institutional changes.

#### 4 CONCLUSION

Regardless of the nature of the crisis in the eurozone, there is a possible way out that could provide the system with a higher level of stability and fairness. The current payments system in the euro area is rather close to the one that Keynes proposed for the reform of the international monetary system at the beginning of the 1940s in spite of some important differences. First, in Keynes's proposal exchange rates are fixed, but adjustable in case the imbalances are too large to be managed. Second, in order to make the external adjustment process more symmetric, all the countries pay interest on their bancor balances, whether they be positive or negative. These two points have been reintroduced in our model. Third, in the 1940s capital movements were limited and under control. Keynes's plan was focused on current imbalances. This remains a big difference. In this paper we tried to model how the clearing union proposal, associated with an international unit of account that is only used for the settlement of international payments, could be modelled in the framework of an SFC model. The Eurosystem already has many of the institutions that would play a key role under such a regime. Our model shows which way the existing institutions should be modified in order to make the eurozone an area less prone to producing large imbalances which, in the absence of either a system of fiscal transfers between regions or a central bank that can provide unlimited liquidity to deficit countries, will inevitably suffer from recurrent crises (Bibow 2012). The simulations presented illustrate the dynamic behaviour that each institutional setting would bring about. In many simulations the threshold for currency adjustments seems to be critical. If it is too small, there will be instability associated with repeated devaluation/revaluation. If it is too large, this instability is avoided but instead stock imbalances can build up over time, forcing delayed readjustment at some later time. The key point to emphasise is that country members must avoid persistent competitiveness and current-account imbalances to prevent these instabilities from arising. The expansionary proposals that take up Keynes's ideas may conduct European countries to a stronger and more sustainable growth cycle. By means of an SFC model we found that Europe could move towards a brighter future should there be the political will either to reduce the structural heterogeneity within the area (through supply-side policies that help develop the productive structure of southern countries) or to allow for exchange-rate adjustments when external imbalances within the area become unsustainable.

## REFERENCES

- Amato, M., Fantacci, L. (2014): *Saving the Market from Capitalism*, Cambridge, UK: Polity Press.
- Amato, M., Fantacci, L., Papadimitriou, D., Zezza, G. (2016): Going forward from B to A? Proposals for the Eurozone crisis, Levy Economics Institute, Working Paper No 866, May.
- Bibow, J. (2012): The Euro debt crisis and Germany's Euro trilemma, Levy Economics Institute, Working Paper No 721.
- Cesaratto, S. (2013): The implications of TARGET2 in the European balance of payments crisis and beyond, in: *European Journal of Economics and Economic Policies: Intervention*, 10(3), 359–382.
- Constâncio, V. (2014): The European crisis and the role of the financial system, in: *Journal of Macroeconomics*, 39, 250–259.
- De Grauwe, P. (2013): Design failures in the eurozone: can they be fixed? LSE 'Europe in question' discussion paper series.
- Duwicquet, V., Mazier, J. (2012): Financial integration and stabilization in a Monetary Union without or with bank rationing, in: Papadimitriou, D., Zezza, G. (eds), *Contributions to Stock–Flow Modeling: Essays in Honor of Wynne Godley*, New York: Palgrave Macmillan, 197–234.
- Duwicquet, V., Mazier, J., Saadaoui, J. (2013): Désajustements de change, fédéralisme budgétaire et redistribution: comment s'ajuster en union monétaire?, in: *The euro area in crisis: Debates and Policies*, OFCE, 127, January, 57–97.
- Duwicquet, V., Mazier, J., Saadaoui, J. (2018): Dealing with the consequences of exchange rate misalignments on macroeconomic adjustment in the Economic and Monetary Union, in: *Metroeconomica*, 69, 737–767.
- Fantacci, L. (2013): Why not bancor? Keynes's currency plan as a solution to global imbalances, in: Marcuzzo, M.C., Mehrling, P., Hirai, T. (eds), *Keynesian Reflections, Effective Demand, Money, Finance and Policies*, New Delhi: Oxford University Press, 172–195.
- Godley, W., Lavoie, M. (2005): Comprehensive accounting in a simple economy macroeconomics with endogenous sterilization or flexible exchange rates, in: *Journal of Post-Keynesian Economics*, 28(2), 241–276.
- Godley, W., Lavoie, M. (2007a): *Monetary Economics: An Integrated Approach to Credit, Money, Income, Production and Wealth*, New York: Palgrave Macmillan.
- Godley, W., Lavoie, M. (2007b): A simple model of three economies with two currencies: the eurozone and the USA, in: *Cambridge Journal of Economics*, 31(1), 1–24.
- Keynes, J.M. (1941): Proposals for an International Clearing Union, 15 December 1941, in *Collected Writings*, vol. 25, London: Macmillan and Cambridge, UK: Cambridge University Press, 74.
- Lapavistas, C. (2012): *Crisis in the Eurozone*, London: Verso Books.
- Lavoie, M. (2015): The euro zone crisis: a balance of payment problem or a crisis due to a flawed monetary design?, in: *International Journal of Political Economy*, 44(2), 57–60.
- Lavoie, M., Zhao, J. (2010): A study of the diversification of China's foreign reserves within a three-country stock–flow consistent model, in: *Metroeconomica*, 61(3), 558–592.
- Mazier, J., Tiou-Tagba Aliti, G. (2012): World imbalances and macroeconomic adjustments: a three country Stock Flow Consistent model with fixed or flexible prices, in: *Metroeconomica*, 63(2), 358–388.
- Mazier, J., Valdecantos, S. (2014): A detailed representation of the Eurosystem and the current crisis in the Eurozone, CEPN Working Paper No 02-2014.
- Mazier, J., Valdecantos, S. (2015): A multi-speed Europe: is it viable? A stock–flow consistent approach, in: *European Journal of Economics and Economic Policies: Intervention*, 12(1), 95–112.
- Nikiforos, M., Carvalho, L., Schoder, C. (2015): 'Twin deficits' in Greece: in search of causality, in: *Journal of Post Keynesian Economics*, 38, 302–330.
- Stockhammer, E. (2011): Peripheral Europe's debt and German wages: the role of wage policy in the Euro area, in: *International Journal of Public Policy*, 7(1), 83–96.
- Storm, S., Naastepad, C.W.M. (2015): Crisis and recovery in the German economy: the real lessons, in: *Structural Change and Economics Dynamics*, 32(1), 11–24.