

Financial integration and macroeconomic adjustments in a Monetary Union

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Abstract

In a monetary union like the euro area adjustments facing asymmetric shocks or evolutions are more difficult due to fixed intra-European exchange rates. The efficiency of relative-price adjustment mechanisms is limited. Labour mobility remains limited in the EU and, even in the US case, inter-regional migrations follow a rather long term dynamics. Fiscal policy can play a more active role, especially at the federal level, when it exists. Capital markets well integrated at the regional level, with portfolio diversification, capital income transfers and intra-zone credit, can constitute a last mechanism. This question has been examined in detail by the “risk sharing” approach. Indirect econometric methods have been used to estimate the importance of adjustment mechanisms through foreign capital income transfers and international capital flows (Asdrubali et alii, 1996; Asdrubali and Kim, 2004, 2007). Their stabilization coefficients would be quite important, around 25% each in the case of the USA. This result is used by advocates of a liberal economic policy in the EU to promote a deeper monetary and financial integration without having to develop a Federal budget. However the theoretical basis and the econometric methodology used can be both criticised, especially for the stabilization effect of intra-zone credit.

A different approach is adopted in this paper based on a “stock-flow consistent” model of a Monetary Union with two countries in the line of Godley and Lavoie (2007). The model describes assets and liabilities of all the agents and analyses financial integration in a consistent manner. This stock-flow consistent approach allows a comprehensive analysis of real and financial adjustments through capital income (interests, dividends and capital gains) and external finance (credit, equities and bonds). Alternative versions of the model are considered, a model without foreign financial assets and without intra-zone credit, a complete model with foreign assets and foreign loans where the degree of financial integration can be more or less developed, a model with intra-zone credit but without intra-zone capital income transfers. These different versions are used to study adjustments facing asymmetric shocks.

Two results can be underlined. Foreign assets holding has a stabilising role but the capital income stabilising coefficient seems smaller than the one obtained by the “risk sharing” approach. On the opposite, foreign loans (intra-zone credit) seem to have no specific stabilization effects. Models with, or without, foreign financing inside the monetary union give the same results. This is due to the credit mechanism in a monetary union and to the key role played by refinancing by the Central Bank. Inside a monetary union, domestic credit and foreign credit from an other member of the Union are of the same type. There is no increase of the stabilization coefficient to expect from development of intra-euro zone credit. This conclusion appears opposite to Asdrubali et al. (1996, 2004, 2007) conclusions and to the ECB and European Commission recent declarations.

Key words: Open economy macroeconomics; international finance; post-Keynesian modelling

JEL classification: F41, F37, E12

1. Introduction

With the settlement of the single currency the adjustments inside the Monetary Union facing asymmetric shocks or evolutions are more difficult due to fixed intra-European exchange rates. Since the launching of the euro divergences between European economies' evolutions have been more important than generally expected. The slowdown observed after 2001 has been unequal according to the countries. The blocking of the large continental countries, especially Germany, has contrasted with the better performances of smaller and more peripheral countries like Finland or Ireland. France and Italy have been stuck in slow growth while Spain was led by the housing bubble. Divergences regarding inflation are also significant. The new financial crisis doesn't hurt all the countries in the same way, although all of them are touched. Such an environment has once more brought to the fore traditional questions related to monetary union, that is, the nature of adjustment mechanisms and the difficulties due to asymmetric evolutions.

Adjustment mechanisms inside a monetary union are defined in a broad sense as mechanisms which permit a country, after a shock, to return to the initial situation or, possibly, to full employment. They are of different nature. Relative wage and price flexibility had been proposed from the start by single currency instigators in order to take the place, at least partially, of exchange rate adjustments (Commission of European Communities, 1990). Factors' mobility, especially labour force's one, is presented as an other potential adjustment mechanism, in line with the traditional theory of the Optimum Currency Area. Fiscal policy can also play a role at the national level inside the constraint of the Stability and Growth Pact and at the federal level, if the institutional framework is adapted. Capital markets well integrated at the regional level, with portfolio diversification, capital income transfers and intra-zone credit, can constitute a last mechanism.

These questions have been examined in detail since the 1990s in a lot of empirical works which underline the limits of many of these mechanisms, especially in the euro zone. The efficiency of relative-price adjustment mechanisms is reduced and, even in the most flexible countries, the return to equilibrium is slow and still incomplete after 10 years. Labour mobility is an other possible adjustment mechanism but it remains limited in the EU and, even in the US case, inter-regional migrations follow a rather long term dynamics which is not reversible and cannot be regarded as an adjustment mechanism. Fiscal policy can play a more active role in a federal State like the USA, but has no equivalent in the European case. Mechanisms linked to regionally well integrated capital markets have been examined in detail by the "risk sharing" approach since the second part of the 1990s. They are largely used by advocates of a liberal economic policy in the EU to promote a deeper monetary and financial integration without having to develop a Federal budget. However the theoretical basis and the econometric methodology used can be both criticised.

That is why a different approach is adopted in this paper based on a "stock-flow consistent" model of a Monetary Union with two countries in the line of Godley and Lavoie (2006) and Lavoie (2003). The model describes assets and liabilities of all the agents (firms, households and State) and analyses financial integration in a consistent manner. The banking system of the Monetary Union is resumed in commercial banks in each country and a single Central Bank. Four kinds of assets are distinguished, monetary assets held by households, bonds issued by each State and held by households of both countries, treasury bills also issued by each State and held by commercial banks, equities issued by firms of both countries and held by households and firms of both countries. Firms can finance their real and financial investments by non distributed profit, banking credit or new equities issued.

This stock-flow consistent approach allows a comprehensive analysis of real and financial adjustments through capital income (interests, dividends and capital gains) and external finance (credit, equities and bonds). Alternative versions of the model are considered:

- a model without foreign financial assets and without intra-zone credit,
- a complete model with foreign assets and foreign loans where the degree of financial integration can be more or less developed,
- a model with intra-zone credit, but without intra-zone capital income transfers.

These different versions are used to study adjustments facing asymmetric shocks. By comparison, it is possible to estimate stabilization coefficients due to foreign capital income and intra-zone credit.

Two results can be underlined. Foreign assets holding has a stabilising role but the capital income stabilising coefficient seems smaller than the one obtained by the “risk sharing” approach. (from 5 % to 18% at medium term, according to the size of financial assets and the share of international capital income). On the opposite, foreign loans (intra-zone credit) seem to have no specific stabilization effects. Models with, or without, foreign financing inside the monetary union give the same results. This is due to the credit mechanism in a monetary union and to the key role played by refinancing by the Central Bank. Inside a monetary union, domestic credit and foreign credit from an other member of the Union are of the same type. There is no increase of the stabilization coefficient to expect from development of intra-euro zone credit. This conclusion appears opposite to Asdrubali et al. (1996, 2004, 2007) conclusions and to the ECB and European Commission recent declarations.

The paper is organised as follow. A second section examines the main empirical studies on macroeconomic adjustments inside a monetary union. A third section gives empirical data about the evolution of financial integration in the EU since the 1990s. A fourth section presents the main characteristics of the two countries stock-flow model used. This kind of model describes assets and liabilities of all the agents (firms, households, banks and State) and analyses financial integration in a consistent manner. A fifth section presents simulations in response to demand and supply (loss of competitiveness) shocks with a simplified version of the model. Evaluations of the stabilization coefficients of foreign capital income and intra-zone credit are given. A last section concludes.

2. Macroeconomic adjustments inside a monetary union: a survey

Macroeconomic adjustments inside a monetary union have been studied in a whole set of empirical studies. The main conclusions can be resumed as follow:

-Relative price adjustment mechanisms in Europe can only allow a very slow and partial return to equilibrium (beyond ten years) facing asymmetric demand or supply shocks. These mechanisms cannot be used as substitutes for exchange rates as adjustment variable (Mazier, et al., 2002 ; Mazier et Saglio, 2008). Similar results are observed at the level of the US states (Blanchard et Katz, 1992). It is largely illusory to hope that more flexibility on the products and labour markets, obtained through structural reforms, will improve these adjustment mechanisms. The different ways countries react when faced with asymmetric shocks are vast and can be accounted for by each country’s structural specificities. These disparities are generating important asymmetries, even in case of symmetric shocks, which make the conduct of economic policy in the monetary union more complicate.

-Labour force inter-regional mobility would play a significant role to re-equilibrate in the US case, contrary to what can be observed in the European case where labour mobility is limited (Blanchard et Katz, 1992). A recent study (L'angevin, 2007) shows that labour mobility would have progressed during the last ten years in the European Union, reflecting a kind of convergence with the US model. However this last result seems fragile, especially because the study merges intra-European migration and total migration, which are quite different. More generally, this thesis on the role of inter-regional migration can be criticized, even in the US case where migrations are following rather long term evolutions which are not reversible at short term and cannot be regarded as adjustment factors at a large scale. Actually, macroeconomic simulations realised at the level of the USA divided in four regions confirm their weak impact at short term. (Buiter, 1995 ; Mazier et al, 2002, 2007).

-The stabilising and redistributive role of fiscal policy would be important in the case of a federal State like the USA. According to rather old evaluations, the stabilization coefficient of the federal budget would be comprised between 15% and 28% (Pisani-Ferry et al., 1992 ; Goodhart et Smith, 1992). This question, theoretical in the European case due to the lack of a federal budget, has been re-examined in a new and enlarged approach, the « risk sharing » one;

-Adjustment mechanisms linked to well integrated capital markets at the regional and international levels have been studied in an abundant literature with the « risk sharing » approach since the second half of the 1990s. Using dynamic general equilibrium models with N open economies and incomplete financial markets, this approach analyses how consumption dynamic can be connected to production changes taking into account international borrowing and international portfolio diversification. The general mode, tested successively for the US states, the European and OECD countries, is the following, with some differences according to the precise method used (Asdrubali, Sorensen et Yosha, 1996 ; Asdrubali et Kim, 2004, 2007 ; Kalemli-Ozcan, Sorensen et Yosha, 2004):

$$\begin{aligned}\Delta \log \text{GDP}_{it} - \Delta \log \text{GNI}_{it} &= a_{Kt} + b_K \Delta \log \text{GDP}_{it} + u_{Kit} \\ \Delta \log \text{GNI}_{it} - \Delta \log \text{DGNI}_{it} &= a_{Ft} + b_F \Delta \log \text{GDP}_{it} + u_{Fit} \\ \Delta \log \text{DGNI}_{it} - \Delta \log \text{C}_{it} &= a_{Ct} + b_C \Delta \log \text{GDP}_{it} + u_{Cit} \\ \Delta \log \text{C}_{it} &= a_{Ut} + b_U \Delta \log \text{GDP}_{it} + u_{Uit} \\ b_K + b_F + b_C + b_U &= 1\end{aligned}$$

with GDP= gross domestic product, GNI= gross national income, DGNI= disposal national income, C= consumption ; per capita and at constant prices.

Table 1 presents the parameters b_i which measure the « risk sharing », i.e. the stabilization coefficient, obtained with the three main stabilization channels:

- b_K for the stabilization through international capital markets, i.e. through capital incomes resulting from international portfolio diversification, which are represented by the difference between GDP and the gross national income GNI ;

- b_F for the stabilization through federal transfers (taxes and redistribution) or inter-states transfers which recover the difference between national income GNI and disposal national income DGNI; this represents the stabilization mechanisms through federal fiscal policies previously analysed;

- b_C for the stabilization through domestic or international credit ; this stabilization mechanism is not clear and raises many interpretation problems, as it is recognised by the authors themselves;

- b_U for the residue, i. e. the part which is not stabilized.

Table 1: « Risk sharing » stabilization coefficient (in %)

	Euro area	Euro area 9	EU 15		OECD			USA		
			EC	AK	EC	MZ	AK	ASY	MZ	AK
b_K	21.2	5.4	18.1	-1.2	8.7	5	-0.5	39	24	35.8
b_F	6.3	3.9	4.3	-1.4	1.7	0	-0.5	13	13	15
b_C	15.3	bcg : 14.6 bcc : -11.4	13.3	23.6	43	13	22.3	23	24	13.5
b_U	57.1	86.5	62.7	79	42.9	80	78.7	25	39	35.8

Source : EC, European Commission 1999-2006 (2007); AK, Asdrubali et Kim 1960-1990 (2004) ; MZ, Melitz et Zumer 1960-1990 (1999) ; ASY, Asdrubali et al. 1964-1990 (1996)

The stabilization through capital income (b_K) seems important in the case of the US states (24 à 39%), small in the case of the OECD countries (0 à 8%) and of a variable magnitude according to the estimations in the case of the European Union (0 à 18%) and of the euro area (5 à 21%). This mechanism is linked to the capital incomes proceeding from foreign assets hold by domestic agents or from assets hold in other states in the case of the USA or the EU. It is all the more important as the domestic bias in the assets holding is weak, as it has been shown by Sorensen et al. (2007). The high level of b_K in the USA would reflect a deep financial integration with portfolio diversification at the level of the whole American area. Logically, this mechanism would be weaker at the level of the OECD countries where the domestic bias remains important, although declining. For the EU, results are more variable. Especially, for the euro area, the stabilization coefficient falls sharply when three small countries are taken out, two of them playing a particular role in the matter of international investments (Luxembourg, Ireland, Portugal). Consequently, the European Commission, as the ECB, is arguing in favour of a deeper financial integration inside the EU in order to increase the role of the financial channel and of the market mechanisms facing asymmetric shocks.

The stabilization by federal or inter-regional transfers (b_F) is around 13 à 15% in the USA. It is close to the results of the previous studies which tried to estimate the stabilization coefficient of the federal State with simplest methods. This mechanism is of course almost inexistent at the level of the OECD countries. For the EU the estimations are once again more divergent (from 0 to 6%), which is not surprising due to the lack of federal budget.

The stabilization by the credit (b_C) raises more problems. It would be important, around 13 to 25%, in the USA and even higher in the OECD countries (between 13 to 43%). In the EU the results are once again divergent (from 3 to 24%). This stabilization mechanism is more difficult to interpret. It is related theoretically to the shock-absorber effects of the international credit in case of negative asymmetric shocks, but also to those of the domestic credit and even of the national public transfers (as it is the case in the CE's estimation (2007) with the distinction between b_{CC} for the private credit and b_{CG} for the public transfers). The authors of these econometric estimations underline the problems of interpretation raised by this equation, especially Asdrubali et Kim (2004) in the detailed analysis made for the European and US cases (pages 821, 828, 830). Indeed the specification of the equation cannot allow an estimation, even rough, of the stabilization effect of the credit. The whole model can be criticized because it is too focused on the consumption- production adjustment and ignore the other components, especially the investment and the firms' revenue. The transition to

econometric tests with a reduced model is then very hazardous. Consequently, it seems difficult to draw significant conclusions from these estimations of the stabilization coefficient by the credit.

However, it is what the European Commission and the ECB do in their recent publications. As stabilization effects are more limited in the EU than in the USA due to the lack of a federal system and to a less advanced intra-European financial integration, the Commission and the ECB plead for a deepening of the financial integration. This would allow simultaneously an increase of the stabilization effect of the capital incomes (b_K) thanks to a more important international portfolio diversification and an increase of the stabilization effect of the credit (b_C) thanks to enlarged intra-European financing, both private and public. As it is rightly stressed by J. C. Trichet (2007), « the functioning of adjustment process is essential for all the European countries, and especially for the euro area. The objective is to avoid that a country or a region, for instance after a specific event or an asymmetric shock, enters into a durable period of slow growth and increasing unemployment or into a phase of persistent overheating ». The ECB and the Commission plead, first, in favour of structural reforms to increase the flexibility of the products and labour markets. But, as it has been explained, there is not much to expect from this direction.

What about financial markets ? According to J.C. Trichet (2007), « well integrated capital markets and numerous opportunities of financial portfolio diversification form an other important market mechanism which can contribute to reduce the impact of shocks in a country or a region ... The US example shows that the financial channel can be more important than the fiscal channel. There it is an additional argument in favour of the acceleration of the financial integration in Europe ».

Yet the assessment of the « risk sharing » approach which has been made invites to re-examine this question with an other perspective. If estimations of stabilization coefficients through capital income and federal transfers can be regarded as acceptable, the stabilization effect of intra-zone credit is more questionable, due a lack of a consistent analysis of the role played by the international credit and finance in the macroeconomic adjustments. That is why a different approach, based on « stock flow consistent » models (SFC) with two countries and inspired by Godley & Lavoie (2006) and Lavoie (2003) works, is proposed. A SFC model with two countries in monetary union allows a consistent description of assets and liabilities of the two countries and of the transaction matrix of real and financial flows. A consistent and explicit analysis of real and financial adjustments is obtained with, for each country, a modelling of capital incomes (interests, dividends and capital gains) and of intra-zone finance.

3. Financial portfolio diversification in the EU since the 1990s

A deeper capital markets' integration inside a monetary union favours the attractiveness of financial assets issued by countries of this zone. The holding of European assets might increase significantly with the intensification of the European financial integration, mainly since the launching of the euro in 1999. For the four main countries of the euro zone (Germany, France, Italy and Spain), it is well confirmed that the international diversification has increased at the level of both assets and liabilities.

Regarding equities, an increasing share of foreign equities in the residents' portfolio, up to 25-30%, can be observed in the four countries. This progression is more marked during 1999-2002 but continues during the most recent years (table 2). On the liability side the same

evolution can be observed. An increasing share of equities issued by residents is held by the rest of the world, which means that foreigners finance more than in the past the domestic economy.

Table 2 : Structure of assets and liabilities

Foreign assets held by residents (in percent of total assets held)	Equities			Bonds		
	1995-1998	1999-2002	2003-2006	1995-1998	1999-2002	2003-2006
France	18,9%	28,2%	31,7%	16,3%	33,8%	51,3%
Germany	10,3%	26,5%	30,1%	17,3%	27,1%	35,1%
Spain	19,3%	23,1%	24,1%	27,6%	48,6%	66,9%
Italy	22,2%	29,9%	32,1%	12,5%	24,3%	26,4%
National assets held by non residents (in percent of total assets issued)	Equities			Bonds		
	1995-1998	1999-2002	2003-2006	1995-1998	1999-2002	2003-2006
France	17,3%	20,8%	20,3%	19,9%	32,3%	48,9%
Germany	11,4%	16,9%	21,5%	27,9%	35,3%	44,1%
Spain	26,4%	30,9%	32,5%	32,0%	48,6%	71,4%
Italy	13,5%	13,9%	17,4%	22,7%	33,7%	40,6%

Source : Eurostat, balance sheets, calculation of authors

This phenomenon is even more pronounced on the bonds' market. The share of foreign bonds held by residents is rising, up to 26-35% in Italy and Germany and 51-67% in France and Spain during 2003-2006 (table2). On the liability side the trend is the same and even stronger with 41-44% in Italy and Germany and 49-71% in France and Spain of bonds issued by residents and held by non residents during the last period.

Compared with the previous assets, loans are less internationalised, even if a rising trend can also be observed (table 3). The share of credit supplied to (and by) the rest of the world remains in 2003-2006 around 15% (but only 7% in Spain for the credit supplied to foreigners).

Table 3: Credits supplied by (and to) the rest of the world

Credits	Credits supplied by the rest of the world			Credits supplied to the rest of the world		
	1995-1998	1998-2002	2003-2006	1995-1998	1998-2002	2003-2006
France	5,9%	11,5%	14,0%	10,6%	16,1%	19,0%
Germany	5,6%	11,2%	13,9%	8,7%	14,7%	17,2%
Spain	10,8%	14,8%	15,5%	5,8%	7,3%	7,1%
Italy	16,7%	17,3%	15,9%	14,4%	15,9%	15,1%

Source : Eurostat, balance sheets, calculation of authors

Until now the national stock-flow accounts (Eurostat) have given the share of the rest of the world in the residents' assets and liabilities. But, for a better understanding of intra-European adjustments, it would be more pertinent to have information on the relations inside the euro area, between one country and the rest of the euro area. Thanks to IMF annual studies on portfolio investments measured in stock (CPIS)¹, it is possible to get a geographic structure of the domestic assets held by non residents and of the foreign assets held by residents with a

¹ Coordinated portfolio investment survey (CPIS), FMI

share between the euro area, the EU and the rest of the world without EU. Table 4 gives the structure for the equities, short term debt securities and long term debt securities.

Financial integration appears important inside the EU. For the whole euro area, around 60% of domestic equities held by foreigners are held by countries from the EU and 50% by euro area's members. Regarding foreign equities held by residents, the share of the euro area is even higher (70% of foreign equities held by German residents are from the euro area, almost 80% from the EU).

The share of European long term debt securities is high for the holding (around 75 % for the EU) as well as for the issuing (73% for the euro area). Short term debt securities seem slightly less integrated than the long term ones at the European level, although differences exist between countries (in Italy almost all the foreign short term securities held are from the euro area).

The general trend resorting from this table is a high share of intra-European assets which means that the European financial integration is already largely advanced.

Table 4 : Domestic assets held by non residents and foreign assets held by residents :
The European share (2006)

(Share of each area in the total of non residents)										
Domestic assets held by non residents	France		Germany		Spain		Italy		Euro area	
	%Euro area	%EU								
Equities	39,7%	51,8%	42,3%	56,0%	40,4%	55,1%	50,6%	63,0%	51,4%	63,8%
Long term securities	53,9%	63,5%	53,1%	59,4%	78,6%	88,1%	79,6%	88,1%	63,3%	72,7%
Short term securities	35,5%	48,5%	41,7%	49,8%	73,3%	78,6%	62,1%	68,9%	42,0%	54,5%
(Share of each area in the total of foreign assets)										
Foreign assets held by residents	France		Germany		Spain		Italy		Euro area	
	%Euro area	%EU								
Equities	50,5%	63,6%	69,6%	76,9%	77,0%	82,9%	79,3%	82,6%	49,0%	60,6%
Long term securities	66,8%	76,6%	66,8%	80,2%	56,8%	69,6%	64,9%	71,0%	63,2%	74,6%
Short term securities	43,9%	72,1%	67,4%	79,5%	55,7%	64,8%	96,5%	97,5%	36,7%	63,0%

Source : CPIS, IMF, calculation of authors

After the exam of the foreign share for each asset, the next step is to study the share of the rest of the world in terms of property income (including dividends) and interests. Table 5 gives, in % of the GDP, the property income and interests received (in gross and net terms) by each sector of the economy and the origin (domestic or foreign) of these capital incomes. In all the countries the interests received decrease from 1995 to 2006 in relation with the progressive fall of the interest rates but remain at a rather high level (19% of GDP in France and Germany). On the opposite the dividends received increase up to 13-17% of GDP in France, Italy and Germany. Financial companies benefit more of the interests while non financial companies and households benefit more of the dividends.

Interests and dividends received from the rest of the world have increased, mainly in France and Germany up to more than 6% of GDP, in line with the rising share of foreign assets in the residents' portfolio. This illustrates the potential role of macroeconomic stabilization they could play. However this share of capital income received from abroad remains relatively small by comparison with the share of foreign assets in the whole assets (around 15% of total dividends for a share of foreign equities of 30%; around 30% of total interests for a share of foreign bonds of 50%). This reflects a smaller rate of return of assets held abroad or a smaller transfer of profit from abroad. This relative weakness of capital income received from the rest of the world reduces the stabilization role they can potentially play according to the "risk sharing" approach.

In net terms, the capital incomes received are less important, as incomes paid to the rest of the world are taken into account. Net property incomes are slightly negative in France and Italy (-0.5% of GDP), positive in Germany (0.5% of GDP) and negative in Spain (-2.2% of GDP), in line with the increasing Spanish net foreign debt. However the stabilization mechanism could be pertinent, as households receive capital income from abroad, which could theoretically sustain their disposal income.

A broad view of the share of the main financial assets in % of GDP is given in table 6. The financialization of the economy is illustrated by the growing weight of equities, especially in France. Germany, Italy and Spain keep a more equilibrated structure, contrary to France where the share of credit appear more limited.

Table 6 : Share of the main financial assets in percentage of GDP

Financial assets	France		Germany		Spain		Italy	
	1995	2006	1995	2006	1995	2006	1995	2006
Currency and deposits	99,3%	120,5%	113,7%	162,6%	113,0%	121,7%	98,5%	99,8%
Securities other than equities	78,6%	129,2%	72,6%	110,7%	49,4%	59,8%	95,2%	107,3%
Credits	107,9%	123,2%	131,9%	152,0%	82,2%	176,9%	81,5%	119,5%
Equities	139,8%	391,5%	91,1%	182,8%	65,7%	159,2%	57,5%	131,1%
Insurance technical reserves	34,4%	70,0%	39,7%	60,3%	16,2%	28,1%	17,8%	42,5%
Other accounts	29,5%	39,4%	21,9%	36,5%	26,9%	24,2%	14,0%	16,8%

Source : Eurostat, balance sheets, calculation of authors

The net financial wealth of each sector is given in table 7. The net financial wealths of France and Germany are positive in 1995 as in 2006 while Italy and especially Spain have a net foreign debt. Germany and Spain are in clear opposition with a growing net wealth for Germany and an increasing net foreign debt for Spain, linked to its large current account deficit. With the growing financial integration inside the EU, the German current surplus contributes to finance the Spanish deficit.

In France and Germany, the negative net financial wealths of the non financial companies and of the public administrations are compensated by the positive net financial wealth of the households and of the financial companies. In Spain, in spite of the decline of the net public debt, the net financial wealth of the households is too limited to compensate the net debt of the firms. Last, in Italy, the increasing net wealth of households cannot balance the public debt in spite of its slight reduction. The amplitude of the fluctuations of the net wealths can be underlined, especially between 2005 and 2006.

Table 7 : Net financial wealth in percentage of GDP

Net asset	France			Germany			Spain			Italy		
	1995	2005	2006	1995	2005	2006	1995	2005	2006	1995	2005	2006
National economy	5,0	9,7	3,6	1,7	9,6	15,0	-21,2	-49,1	-60,1	-7,0	-5,8	-5,1
Non-financial corporations	-56,6	-101,8	-117,5	-48,2	-65,4	-67,1	-70,8	-114,8	-129,1	-64,1	-87,7	-87,7
Financial corporations	1,4	22,4	21,6	-0,7	3,0	3,3	-0,6	2,5	-0,6	5,5	-13,7	-13,9
Administrations	-37,5	-43,5	-38,2	-30,8	-49,9	-48,7	-50,7	-30,2	-24,9	-98,8	-94,6	-92,5
Households	97,7	132,5	137,7	81,3	121,9	127,6	100,9	93,4	94,5	150,3	190,2	188,9

Source : Eurostat, balance sheets, calculation of authors

The general conclusion of this study of the European financial structure is a growing international diversification, mainly inside the European Union and, to a lesser extent, inside the euro area. Consequently, international flows of capital income are also increasing inside the EU, but with a more reduced amplitude than the capital internationalisation. This growing financial integration in the euro area raises the question of the impact of the capital incomes and the intra-zone finance on the adjustment mechanisms inside the monetary union. This portfolio diversification will be described with a “stock flow consistent” (SFC) model with two countries. This approach allows a complete description of the whole set of assets and liabilities and a measure of the stabilization coefficients related to foreign capital incomes and to intra-zone finance.

Table 5 : Interests and property incomes received and paid (in percentage of GDP)

	Non financial companies		Financial companies		Public administrations		Households		Total economy		From national economy		From rest of the world	
	1995	2006	1995	2006	1995	2006	1995	2006	1995	2006	1995	2006	1995	2006
France														
<i>Received</i>														
Interest	2,3%	2,9%	17,3%	13,4%	0,5%	0,2%	4,8%	2,1%	25,0%	18,6%	22,5%	14,0%	2,5%	4,6%
Distributed income of companies	2,6%	7,4%	0,9%	2,4%	0,7%	0,4%	2,4%	3,6%	6,6%	13,8%	6,0%	12,1%	0,6%	1,7%
<i>Net (received - paid)</i>														
Interest	-2,8%	-1,3%	2,9%	2,2%	-3,0%	-2,4%	2,7%	0,7%	-0,2%	-0,8%	0,0%	0,0%	-0,2%	-0,8%
Distributed income of companies	-2,8%	-3,9%	-0,2%	0,3%	0,7%	0,4%	2,4%	3,6%	0,1%	0,4%	0,0%	0,0%	0,1%	0,3%
Germany														
<i>Received</i>														
Interest	0,9%	1,6%	14,8%	14,2%	0,6%	0,4%	4,9%	3,3%	21,2%	19,5%	18,7%	14,3%	2,5%	5,2%
Distributed income of companies	0,8%	1,8%	0,8%	2,0%	0,4%	0,3%	8,4%	12,6%	10,4%	16,7%	9,8%	14,8%	0,6%	1,9%
<i>Net (received - paid)</i>														
Interest	-1,6%	-1,0%	3,0%	2,5%	-2,9%	-2,4%	1,2%	0,8%	-0,4%	-0,1%	0,0%	0,0%	-0,4%	-0,1%
Distributed income of companies	-8,1%	-12,2%	-0,6%	-0,1%	0,4%	0,3%	8,4%	12,6%	0,1%	0,6%	0,0%	0,0%	0,1%	0,6%
Spain														
<i>Received</i>														
Interest	1,1%	0,7%	17,5%	10,0%	0,4%	0,4%	5,4%	2,6%	24,4%	13,7%	22,2%	11,5%	2,2%	2,3%
Distributed income of companies	0,8%	2,1%	0,5%	1,2%	1,3%	0,4%	0,7%	2,1%	3,2%	5,8%	3,1%	4,3%	0,1%	1,5%
<i>Net (received - paid)</i>														
Interest	-4,3%	-2,9%	6,3%	1,4%	-4,8%	-1,3%	2,4%	0,8%	-0,4%	-2,1%	0,0%	0,0%	-0,4%	-2,1%
Distributed income of companies	-1,3%	-2,5%	-0,9%	0,0%	1,3%	0,4%	0,7%	2,1%	-0,3%	-0,1%	0,0%	0,0%	-0,3%	-0,1%
Italy														
<i>Received</i>														
Interest	1,3%	1,2%	13,8%	8,0%	1,3%	0,3%	11,7%	4,8%	27,9%	14,3%	25,7%	11,1%	2,2%	3,2%
Distributed income of companies	0,7%	2,1%	0,5%	0,9%	0,1%	0,2%	9,6%	9,3%	10,9%	12,6%	10,4%	11,6%	0,5%	1,0%
<i>Net (received - paid)</i>														
Interest	-3,1%	-0,8%	2,4%	1,4%	-10,7%	-4,4%	10,1%	3,8%	-1,4%	-0,1%	0,0%	0,0%	-1,4%	-0,1%
Distributed income of companies	-9,5%	-9,2%	-0,1%	-0,6%	0,1%	0,2%	9,6%	9,3%	0,1%	-0,2%	0,0%	0,0%	0,1%	-0,2%

Source : Eurostat, national account, calculation of authors

4. A stock-flow consistent model of two countries in Monetary Union with equities, two banks and a Central Bank

The Monetary Union is composed of two countries (N and S) with an asymmetry of size. The country S is five times larger than the country N. This configuration helps to analyse the adjustment mechanisms of the country N facing the rest of the Monetary Union. This model is inspired from Lavoie (2003) and Godley & Lavoie (2006). Compared with Lavoie's model, we introduce asymmetry, real and financial capital accumulation, equities issued by firms, two commercial banks with credit supply. Households hold banking deposits, bonds and equities. We keep a similar representation of the Central Bank and the two governments which issue bonds and treasury bills. On the whole six kinds of assets are distinguished:

- bank deposits held by households,
- bonds issued by governments and held by households of both countries,
- equities issued by firms and held by households and firms of both countries,
- treasury bills issued by each State and held by commercial banks of both countries,
- high powered money held by households and commercial banks (reserve requirements),
- advances supplied by ECB to commercial banks.

The stock-flow consistent approach allows a comprehensive analysis of real and financial adjustments inside a Monetary Union. Adjustments through foreign capital income (interests, dividends, capital gains) and foreign finance (loans, bonds, treasury bills, equities) can be studied specifically. Table 8 describes the balance sheet of each sector. National accounts in flows and equations of the model are given in annex.

Table 8: Balance sheet

	Households N	Firms N	State N	Banks N	ECB	Households S	Firms S	State S	Banks S	Total
Capital		+Kn					+Ks			+Kn+Ks
Deposits	+BDn			-BDn		+BDs			-BDs	0
Currency	+Hnh			+Hn	-H	+Hsh			+Hs	0
Credits		-Ln		+LnN					+LsN	0
				+LnS					+LsS	0
Refinancing				-RFn	+RFn+RFs				-RFs	0
Bonds	+pbn*BnN		-pbn*BN			+pbn*BsN				0
	+pbs*BnS					+pbs*BsS		-pbs*BS		0
Bills			-BTn	+BTnN					+BTsN	0
				+BTnS				-BTs	+BTsS	0
Equities	+pen*EnNm	+pen*EnNe				+pen*EsNm	+pen*EsNe			0
		-pen*EN								0
	+pes*EnSm	+pes*E*EnSe				+pes*EsSm	+pes*EsSe			0
							-pes*ES			0
Wealth	-VHn	-Vn	-Dn	-VBn		-VHs	-Vs	-Ds	-VBs	-Kn-KS
Total	0	0	0	0	0	0	0	0	0	0

Households

Households have traditional consumption behaviour with a wealth effect. The share of wages is constant. Households' portfolio choice follows the approach developed by Godley (1999) and Tobin (1969) with an arbitrage between bank deposits, bonds and equities.

Consumption

$$CN = a_0 + a_1 * YHSNh + a_2 * VHN(-1)$$

VHN= households' wealth

$$YDNh = WN + id * BDN(-1) + BNN(-1) + BNS(-1) + DIVNNh + DIVNSh - TN$$

$$YHSNh = YDNh + CGNh$$

with YDh= households' disposable income, YHSNh= Haigh Simon disposable income with capital gains (CGh), W= wages, B(-1)= interest on domestic and foreign bonds, id*BD(-1)= interests on bank deposits received by households, DIVh= dividends received by households from domestic (DIVNN or DIVSS) and foreign equities (DIVNS or DIVSN), T=income taxes

Capital gains on equities and bonds held

$$CGNh = dpbN * BNN(-1) + dpbS * BNS(-1) + dpeN * ENNh(-1) + dpeS * ENSh(-1)$$

Households' bonds demand

$$pbN * BNN / VHN = v_0 + v_1 * rbN - v_2 * rbS - v_3 * id - v_4 * reN - v_5 * reS$$

$$pbS * BNS / VHN = v_0 + v_1 * rbS - v_2 * rbN - v_3 * id - v_4 * reN - v_5 * reS$$

where rb= interest rate on bonds, id= interest rate on bank deposits, re= rate of return on equities

Households' equities demand

$$peN * ENNh / VHN = v_0 - v_1 * rbN - v_2 * rbS - v_3 * id + v_4 * reN - v_5 * reS$$

$$peS * ENSh / VHN = v_0 - v_1 * rbN - v_2 * rbS - v_3 * id - v_4 * reN + v_5 * reS$$

Cash demand

$$HNh = \lambda_0 * CN$$

Transaction demand of money

Firms

Firms have both real and financial accumulation. Their fixed investment depends of profit rate and debt structure with a possible demand effect. Their financial accumulation is mainly related to the rate of return on equities with an arbitrage between domestic and foreign assets. Firms can finance their investments by non distributed profit, banking credit or equities. New equities issued by firms are determined as a percentage of real and financial investment.

Fixed investment

$$IN^d / KN(-1) = k_1 * UPN(-1) / KN(-2) + k_2 * d(YN) / YN(-1) - k_3 * LN(-1) / KN(-1) - k_4 * rl + k_0$$

General determinants of desired fixed investment are a profit effect, an accelerator effect, a negative influence of the debt ratio and credit cost; K= fixed capital stock

$$UPN = YN - WN - rl * LN(-1) - DIVN + DIVNNe + DIVNSe$$

UP= undistributed profit, L= loans, rl= interest rate on loans, DIV= distributed dividends,

DIVe = received dividends on equities held

$$IN^r = d(LN^s) + UPN + peN * dEN - peN * dENNe - peS * dENSE$$

I^r = restricted investment determined by the different flows of financing profit, equities and credit rationing from banks L^s

$$IN = \min(IN^d, IN^r)$$

Balance of firms' flows of funds

$$d(LN^d) = IN^d - UPN - peN*dEN + peN*dENNe + peS*dENSE$$

Determining the flow of new loans dL^d desired by firms by balance of the flow of funds

Firms' equities demand

$$peN*ENNe/(KN + peN*ENNe + peS*ENSE) = f1*reN - f2*reS + f3*(UPN/KN(-1)) + f0$$

$$peS*ENSE/(KN + peN*ENNe + peS*ENSE) = f1*reS - f2*reN + f2*(UPN/KN(-1)) + f0$$

Financial capital accumulation is related to the rate of return on equities held (re), with a profit rate effect

Equities issued

$$peN*d(EN)/(IN + peN*d(ENNe) + peS*d(ENSE)) = g1*r1 + g2*(LN/(LN+peN*EN +VN))(-1) + g3$$

New issued equities as a percentage of real and financial investment with a positive effect of credit cost and of the debt ratio;

Rate of return on equities

$$reN = d(peN)/(peN(-1)) + DIVN/(peN*EN)(-1)$$

Firms capital gains

$$CGNe = d(peN)*ENNe(-1) + d(peS)*ENSE(-1)$$

Income distribution

Wages

$$WN = r0 * YN$$

(constant share of wages)

Dividends distributed

$$DIVN = (1 - sf) * (YN(-1) - WN(-1) - r1 * LN(-2))$$

$$DIVNNe = DIVN*(ENNe/EN)(-1)$$

$$DIVNNh = DIVN*(ENNh/EN)(-1)$$

$$DIVSNe = DIVN*(ESNe/EN)(-1)$$

$$DIVSNh = DIVN*(ESNh/EN)(-1)$$

Banks

Banks have a supply of credit behaviour related to the financial fragility of firms resumed by their rate of profit and their debt structure. Credit rationing can occur when credit demand is larger than credit supply. The share of loans supplied by domestic and foreign banks is simply related to the degree of openness of the economy.

Credit rationing

$$dLN^s = \alpha n_1(UPN/KN-1) - \alpha n_2(LN-1/KN-1) + \alpha n_3$$

Supply of credit by banks depends of the financial fragility of firms resumed by two parameters, the rate of profit (describing the ability of firms to face debt commitments) and the debt to capital ratio (as a proxy of firms' financial soundness).

$$dLN = \min(dLN^d, dLN^s)$$

Share of loans supplied by domestic and foreign banks

$$dLN = dLNN + dLSN$$

$$LSN = (XN/YN)(0) * LN$$

Bank balance

$$dRFN = dHN + dLNN + dLNS + dBTNN + dBTNS - dBDN - PBN$$

$$HN = \varepsilon * BDN$$

RFN= refinancing by the Central Bank

HN= reserve requirements in high powered money that do not provide interest payments and represent a fixed share of bank deposits

Central Bank

$$T\epsilon B = ib * (RFN(-1) + RFS(-1))$$

The Central Bank pays taxes equal to its profit which are shared between the two national governments

Interest rates

$$rl = ib + m1b$$

$$id = ib - m2b$$

$$r = rl$$

$$rbN = r$$

To simplify interest rate on loans (rl) is supposed equal to the key interest rate of the Central Bank (ib) plus a constant mark up. To realize profits, banks apply a spread between the key rate and the rate on deposits (id). Interest rates on Treasury bills (r) and on bonds (rb) are supposed equal to rl.

Government

Public finance is described in a simple way with exogenous expenditures, taxes related to incomes of households, firms and banks. Treasury bills are purchased by commercial banks without restriction with a share between foreign and domestic bills also related to the degree of openness.

Budget balance

$$d(BTN) = GN + r * BTN(-1) + BN(-1) - TN - TBN - T\epsilon BN - pbN dBN$$

where BT= Treasury bills, T=income taxes, TB= tax paid by Commercial Banks, T\epsilon B= tax paid by the Central Bank, r= interest rate on Treasury bills, B= interest on bonds, pbdB= bonds issued by government

Treasury bills held by Commercial Banks of both countries

$$d(BTN) = d(BTNN) + d(BTSN)$$

$$BTSN = (XN/YN)(0) * BTN$$

Bonds purchased by domestic and foreign households

$$dBN = dBNN + dBNS$$

$$pbN = 1/rbN$$

rb= interest rate on bonds, pb= bonds price

Public debt

$$DN = -BTN - pBN * BN$$

D= public debt in stock

Foreign trade and current account

$$\log(IMN) = \mu_0 + \mu_1 n * \log(YN)$$

$$XN = IMS$$

IMN= imports, XN= exports

With volume effect only

Current balance

The current balance (CUR) is composed of the trade balance, the balance of capital incomes received and paid to the rest of the monetary union and the exchanges inside the banking system. Commercial banks pay interests to the Central bank for their refinancing. But the Central Bank pays taxes to each government.

$$CURN = XN - IMN + \{BNS(-1) + r * BTNS(-1) + r1 * LNS(-1) + DIVNSh + DIVNSe + T\epsilon BN\} \\ - \{BSN(-1) + r * BTSN(-1) + r1 * LSN + DIVSNh + DIVSNe + ib * RFN(-1)\}$$

The current balance, in case of deficit of the country N, is financed through three channels: the holding of more assets of country N (bonds, treasury bills, equities) by country S than the opposite (holding of assets of country S by country N); the channel of credit by banks of country S to firms of country N; the refinancing by the Central Bank which plays a key role as lender of last resort.

A model with 107 equations for 107 endogenous; GN, GS (public expenditures) and ib (key interest rate fixed by the Central Bank) exogenous.

Calibration

The model can be calibrated using balance sheets and national accounts in flows from Eurostat for the European countries. Two sets of calibration have been used, the first one with an important share of equities (400% of GDP as in France in 2006) which reflects a high degree of financialization. Dividends are larger than interests. The second calibration retains a smaller share of equities (172% of GDP) and greater role played by credit. The capital income ratio is also smaller ($K/Y=2$ instead of 4) and equities are more held by firms than by households. Lastly the share of foreign dividends in the total dividends received is kept constant instead of being determined by the structure of equities held, which is more in line with the relative weakness of the capital income received from abroad. This second calibration can be regarded as more realist but the results of the two calibration are rather close, as it will be shown.

The elasticities in the equations are close to usual estimations. The basic scenarios follow a rate of growth of GDP of 2% and a rate of accumulation of 7%. The table 9 gives the values of the main parameters for calibration.

Table 9 : Main parameters for calibration

Equities	400	Dividends received from foreign	7	Distribution of Equities held	
Bonds	23	Interest (Bonds) received from foreign	0,2	Households	50%
Loans	50	Interest (Loans) received from foreign	0,2	Firms	50%
Bills	26	Interest (Bills) received from foreign	0,1	Foreign Dividends determined by detention of foreign equities	
Capital	410	GDP	100		
Elasticities	propensity to consume a1		0,75	GDP growth	2% per year
	Wealth elasticity a2		0,04		
	effect of profit rate on investment k1		0,5	accumulation of capital	7% per year
	Propensity to import m1		1		

Equities	172	Dividends received from foreign	5	Distribution of Equities held	
Bonds	2	Interest (Bonds) received from foreign	0,02	Households	30%
Loans	50	Interest (Loans) received from foreign	0,2	Firms	70%
Bills	60	Interest (Bills) received from foreign	0,6	Share of foreign dividends in the total of dividends received is constant	
Capital	200	GDP	100		
Elasticities	propensity to consume a1		0,75	GDP growth	2% per year
	Wealth elasticity a2		0,04		
	effect of profit rate on investment k1		0,5	accumulation of capital	7% per year
	Propensity to import m1		1		

5. Adjustments inside the Monetary Union and measure of stabilization coefficients

After the presentation of the main characteristics of the model, the analysis of adjustment mechanisms facing supply or demand shocks can be made. It allows a measure of stabilization coefficients, especially for capital incomes and intra-zone finance. Results are given with a simplified version of the model where rates of growth of equity prices are exogenous. Consequently the equations of issuing of equities are taken out.

Four versions of the model

The model is used with four successive versions in order to identify the stabilization effects specific to each factor:

-The basic model (model 1) is without foreign assets and without intra-zone credit; there is no capital income from abroad; the current account is then financed only through the refinancing by the Central Bank to the commercial banks;

-The model 2 is the most complete one with foreign assets and intra-zone credit. Two versions are distinguished. In the model 2-a residents hold 25% of foreign equities in their portfolio which is close to the observed value; in the model 2-b the share of foreign equities is supposed to be higher (80% of the total) which corresponds to a rather unrealistic value, but gives an upper evaluation of the stabilization effects through capital income;

-The model 3 includes the intra-zone credit and the treasury bills, but excludes foreign equities and bonds. Capital incomes from abroad are consequently missing. This model allows an estimation of the stabilization effect of the sole intra-zone credit, by comparison with the basic model 1.

Mechanisms are analysed through three types of shock: a loss of competitiveness, a decrease of consumption and a decrease of capital accumulation. It is supposed that the shock is happening in the country N.

Loss of competitiveness

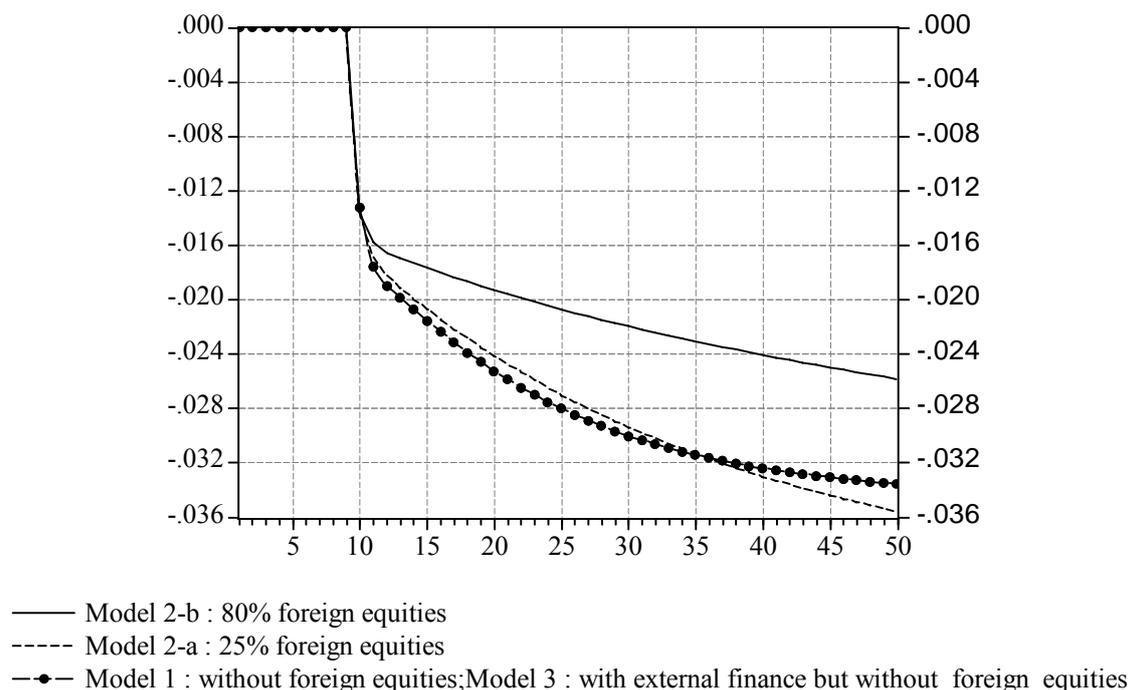
The loss of competitiveness of country N is described by an increase of the import propensity of 1% ($d\mu_{1n} = 0.01$). The GDP of country N decreases (-2.5% at medium term) at the benefit of country S. Trade deficit and current account deficit increase, inducing a larger foreign debt and the payment of interests and dividends to country S. Due to their income's reduction households of country N consume less and demand less assets. Firms of country N adjust in the same way and pay less dividends, which decreases the equities rate of return of country N and makes equities of country S more attractive. Thanks to the holding of country S assets, households and firms of country N can compensate a part of their income decrease.

These adjustment mechanisms through capital incomes and through external finance from country S can be analysed with the different versions of the model. Results will be given in more details with the first calibration, the second one being resumed at the end. The figure 1 compares the decline of the GDP in country N after the loss of competitiveness with the four versions of the model.

The first result is the identity between the basic model 1 (without foreign assets and without intra-zone finance) and the model 3 which incorporates only foreign finance with intra-zone credit and treasury bills. This means that the foreign finance through intra-zone credit or treasury bills has no specific stabilization effect. As the Central Bank refinances already the commercial banks, the development of intra-zone credit or treasury bills have no additional effect facing a shock. In a monetary union there is no difference of nature between domestic credit and foreign, but intra-zone, credit. The refinancing by the Central Bank plays in the same way.

The comparison between the basic model 1 and the two versions of the complete model with foreign assets and capital income 2-a et 2-b is interesting. The decline of the GDP is clearly less pronounced in the model 2-b where the share of foreign assets in total assets is high (and even very high). This means that capital incomes indeed have a stabilization effect. However in the model 2-a where the share of foreign assets is more limited (and more realist), the damping of the shock is reduced, but significant at short-medium term.

At long term there is a reversal characterised by a stabilization which becomes more important in the basic model without foreign assets. This is explained by the more sustained growth which can be obtained in country S when capital income are kept at home and not distributed to country N. This stronger growth of country S is sufficient at long term to sustain the country N growth through more exports from country N to country S. But this only long term effect.

Figure 1 : Effects on the GDP of a loss of competitiveness in country N

A stabilization coefficient is calculated by measuring the gap between the different models. For the model 1, the relative decline of the GDP after the shock (at period 10) can be written at period 13:

$$\frac{(Y_n \text{ after the shock} - Y_n \text{ before the shock})}{Y_n \text{ before the shock}} = -1,99\%$$

For the model 2-a, the same method gives:

$$\frac{(Y_n \text{ after the shock} - Y_n \text{ before the shock})}{Y_n \text{ before the shock}} = -1,91\%$$

The gap between the two models is obtained by the ratio of the relative decrease of the GDP in the two cases:

$$\frac{(Y_n \text{ after the shock} - Y_n \text{ before the shock})/Y_n \text{ before the shock } Model\ 2-a}{(Y_n \text{ after the shock} - Y_n \text{ before the shock})/Y_n \text{ before the shock } Model\ 1} = \frac{-1,91\%}{-1,99\%} = 96,3\%$$

which is equivalent to a stabilization coefficient of 3.7%. The table 10 gives different stabilization coefficients measured with the same method at three periods and for the three models examined.

Table 10 : Stabilization coefficients after a loss of competitiveness

Stabilization	<i>t=13</i>	<i>t=15</i>	<i>t=20</i>
<i>Model 2-a</i>	3,7%	3,9%	4,2%
<i>Model 2-b</i>	14,9%	18,2%	23,5%
<i>Model 3</i>	0,0%	0,0%	0,0%

The stabilization by capital incomes (according to the model 2-a) would be 3,7%, which is small. For the model 2-b the stabilization would be around 14,9% for the period 13, which is higher but corresponds to an unrealistic hypothesis, as it has been said. The underlying idea is simple: more the country N agents hold country S assets, more capital incomes from country S to country N have an adjustment effect, as the country S benefits of a recovery thanks to its gain of competitiveness and distributes more dividends.

The loss of competitiveness and the foreign debt deteriorate the trade and current balances of country N, as it is shown in figure 2. After an initial decline the current balance improves slightly more than the trade balance, thanks to the distribution of dividends of country S to country N. But this effect does not last and is quickly compensated by the rise of capital incomes paid to country S and induced by the growing foreign debt.

The table 12 illustrates the structure of the financing of the current deficit. More than 50% of the deficit is financed by the Central Bank. Net credit by country S banks comes after, followed by country N equities and treasury bills held by country S, and last bonds which are less important.

Figure 2 : Balance of payments of country N after a loss of competitiveness (modèle 2-a)

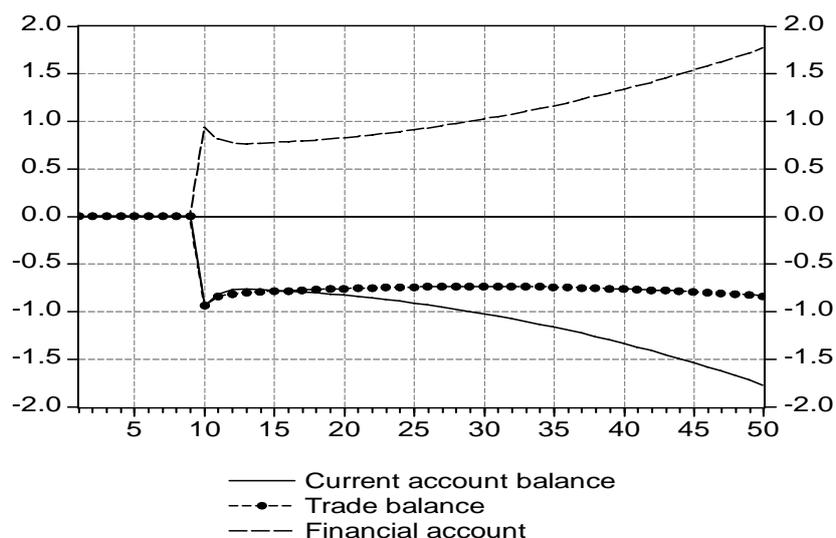


Table 11: Structure of the current deficit at period 13 after a loss of competitiveness of country N

	Value
Current account balance	-0,763
Trade balance	-0,802
Net dividends received from country S	0,068
Net interest on bonds received from country S	-0,003
Net interest on credit supplied by country S	-0,002
Net interest on bills received from country S	-0,001
Tax paid by the ECB	-0,005
Interest paid to the ECB for advances	-0,018

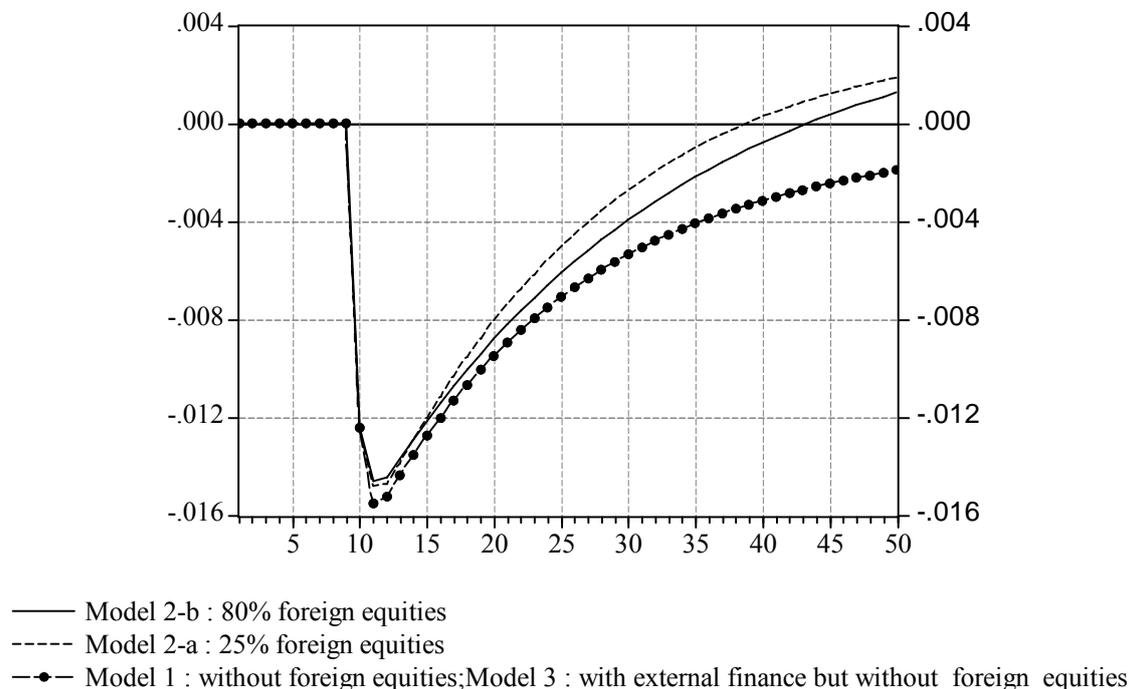
Tableau 12 : Financing the current account deficit

	Value
Net equities held by foreigners : ESN - ENS	0,096
Net bonds held by foreigners : BSN - BNS	0,022
Net credits supplied by foreigners: LSN - LNS	0,117
Net bills held by foreigners : BTSN - BTNS	0,087
Refinancing to the ECB : RFN	0,421
Demand of central currency : HNh	0,016
Banks reserves : HN	0,004

Decline of the consumption

The second shock is a decline of households' consumption equivalent to 1% of GDP (reduction of a_{0n} of 1% of GDP), which also corresponds to an increase of households' saving (i.e. an increase of assets' demand). As usual, the fall of consumption induces a GDP decline of country N (-1.5%). But, more country N agents hold country S assets, more they benefit of capital incomes from country S which contribute to sustain their demand. Capital incomes from country S allow a stabilization at medium-long term as country N households save more and benefit of more capital income from abroad. As a counterpart of this evolution, the trade balance of country S deteriorates (due to the slowdown of country N) and country S foreign debt increases, which rises interests and dividends paid to country N.

Figure 3 : Effects on the GDP of country N of a decline of consumption (-1% of GDP)

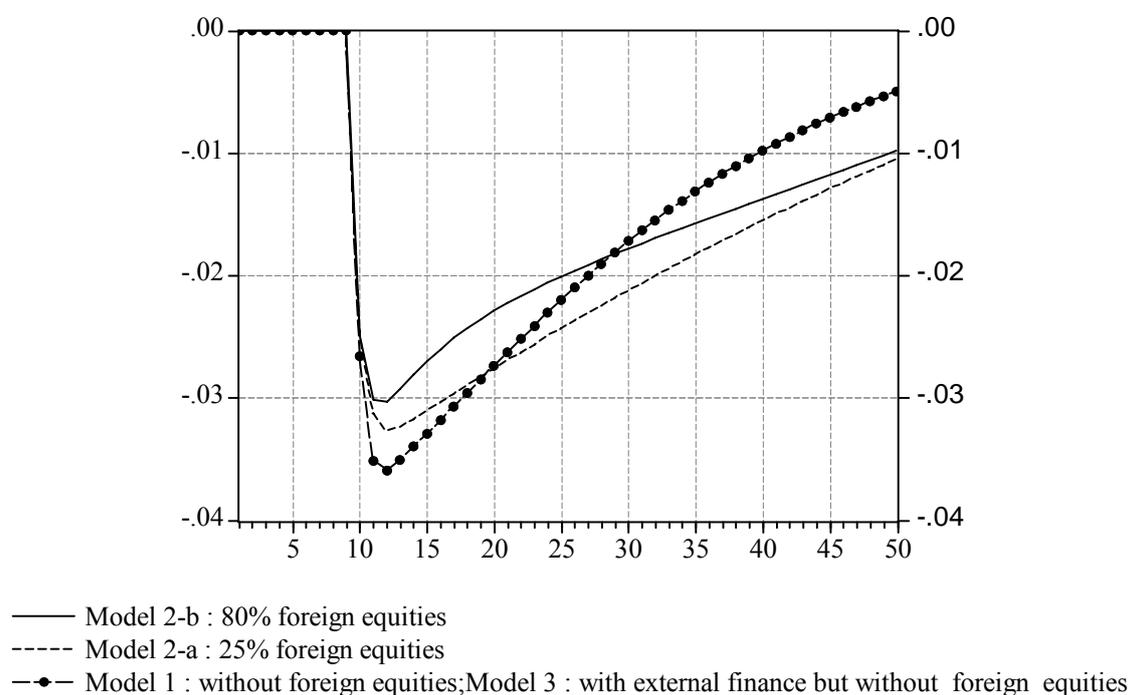


Decline of capital accumulation

The adjustment mechanism is close to the one observed with the negative shock on consumption. A decline of the rate of accumulation ($dk_0N = -0.5\%$) induces a GDP slowdown (-3.5% at short term) which is progressively attenuated. Without surprise the holding of foreign assets by country N has a stabilization effect thanks to the capital incomes which are transferred from country S to country N. The stabilization effect is more important with model 2-b where the share of foreign assets is higher.

As previously, there is a reversal at long term as the model 1 without foreign assets authorises a stronger recovery in country N. In this configuration the country S keeps all its capital income which sustains its growth and, by transmission through the exports, sustains the country N growth.

Figure 4 : Effects of a decline of the rate of accumulation on GDP of country N



The figure 5 resumes the results of the same shocks with the second calibration proposed which can be regarded as closer to the French case. These results are rather similar to the previous ones.

On the whole, for the three shocks considered, an adjustment mechanism exists through the capital incomes, but it seems rather small when a realist value of the share of foreign assets is retained. On the opposite intra-zone credit does not seem to have any stabilization effect. The table 13 gives the whole set of stabilization coefficients for three periods and for the two calibrations considered. With the model 2;b where the share of foreign assets is 80%, the stabilization coefficient is between 5% and 16% after three years with the first calibration and between 3% and 10% with the second. With the model 2.a where the share of foreign assets is more realist, the stabilization coefficient is only between 4 and 8% after three years with the first calibration and between 1% and 8% with the second. The model 3 only with intra-zone finance (credit or treasury bills) but without foreign assets has no stabilization effect.

Figure 5: Effects on GDP of country N with the second calibration

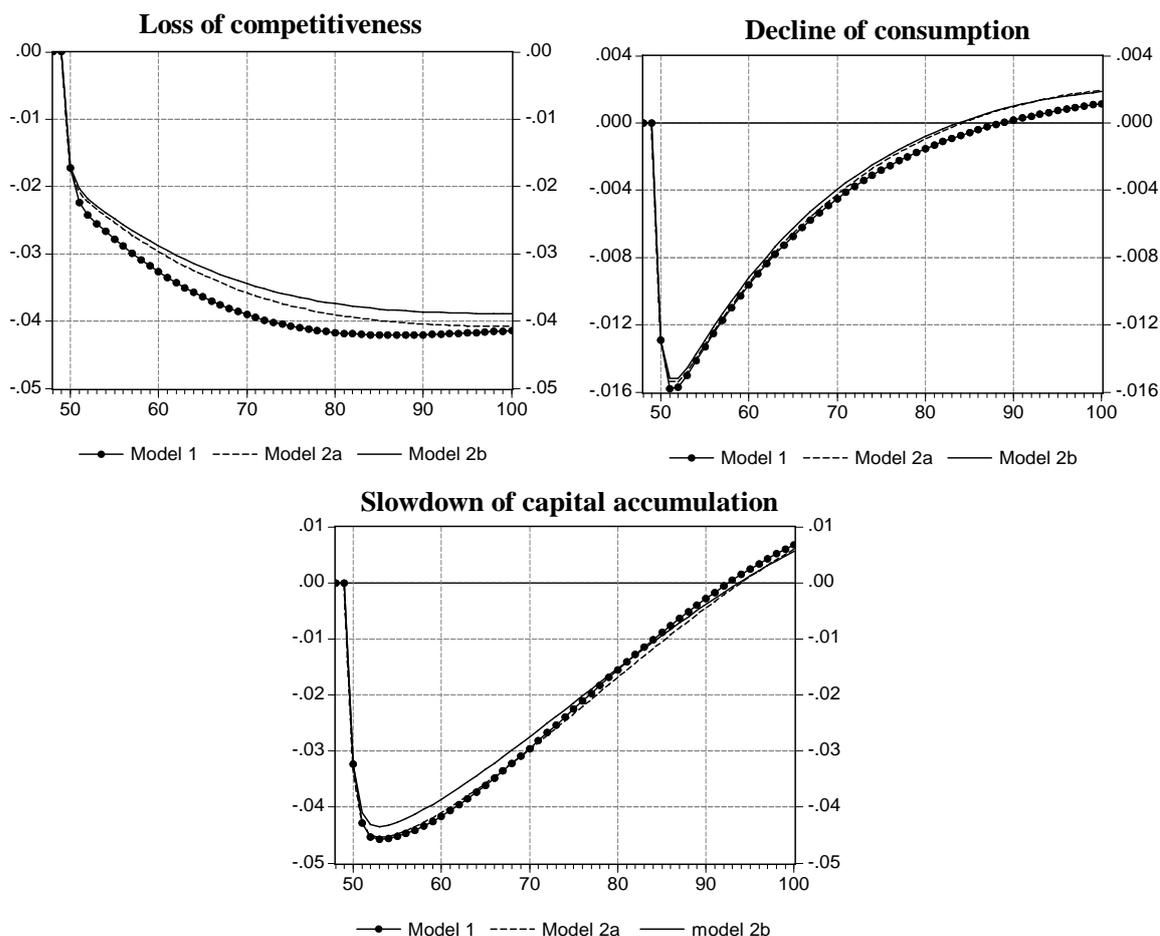


Table 13 : Stabilization coefficients according to the shocks and with the two calibrations

Scenario (shock $t=0$)	First calibration			Other Calibration		
	$t=3$	$t=5$	$t=10$	$t=3$	$t=5$	$t=10$
Loss of competitiveness						
External finance (model 3)	0%	0%	0%	0%	0%	0%
Capital income (model 2-a)	3,7%	3,9%	4,2%	8,3%	8,5%	9,0%
Foreign equities = 80% (model 2-b)	14,9%	18,2%	23,5%	10,4%	10,9%	11,8%
Decrease of consumption						
External finance (model 3)	0%	0%	0%	0%	0%	0%
Capital income (model 2-a)	3,5%	5,6%	14,9%	1,2%	0,7%	0,9%
Foreign equities = 80% (model 2-b)	4,7%	4,7%	7,4%	2,9%	2,9%	4,3%
Slowdown of capital accumulation						
External finance (model 3)	0%	0%	0%	0%	0%	0%
Capital income (model 2-a)	7,7%	5,6%	-0,1%	0,5%	0,9%	1,5%
Foreign equities = 80% (model 2-b)	16,7%	18,0%	16,4%	4,9%	5,7%	7,4%

6. Conclusion

With the settlement of the euro, adjustments inside the Monetary Union facing asymmetric shocks or evolutions are more difficult due to fixed intra-European exchange rates. The efficiency of relative-price adjustment mechanisms is limited and, even in the most flexible countries, the return to equilibrium is slow and still incomplete after 10 years. Labour mobility is another possible adjustment mechanism but it remains limited in the EU and, even in the US case, inter-regional migrations follow a rather long term dynamics which is not reversible and cannot be regarded as an adjustment mechanism. Fiscal policy can play a more active role, especially at the federal level, when it exists, with a stabilising and redistributive coefficient of the US federal budget around 15-20%. Capital markets well integrated at the regional level, with portfolio diversification, capital income transfers and intra-zone credit, can constitute a last mechanism. This question has been examined in detail by the “risk sharing” approach since the second part of the 1990s. Indirect econometric methods have been used to estimate the importance of adjustment mechanisms through foreign capital income transfers and international capital flows (Asdrubali et alii, 1996; Asdrubali and Kim, 2004, 2007; Melitz and Zumer, 2002). Their stabilization coefficients would be quite important, around 25% each in the case of the USA. This result is used by advocates of a liberal economic policy in the EU to promote a deeper monetary and financial integration without having to develop a Federal budget. However the theoretical basis and the econometric methodology used can be both criticised. If estimations of stabilization coefficients through capital income transfers and federal transfers can be regarded as acceptable, the stabilization effect of intra-zone credit is more questionable.

That is why a different approach has been adopted in this paper based on a “stock-flow consistent” model of a Monetary Union with two countries in the line of Godley and Lavoie (2007). The model describes assets and liabilities of all the agents (firms, households and State) and analyses financial integration in a consistent manner. The banking system of the Monetary Union is resumed in commercial banks in each country and a single Central Bank. Four kinds of assets are distinguished, monetary assets held by households, bonds issued by each State and held by households of both countries, treasury bills also issued by each State and held by commercial banks, equities issued by firms of both countries and held by households and firms of both countries. Firms can finance their real and financial investments by non distributed profit, banking credit or new equities issued.

This stock-flow consistent approach allows a comprehensive analysis of real and financial adjustments through capital income (interests, dividends and capital gains) and external finance (credit, equities and bonds). Alternative versions of the model are considered, a model without foreign financial assets and without intra-zone credit, a complete model with foreign assets and foreign loans where the degree of financial integration can be more or less developed, a model with intra-zone credit but without foreign assets and intra-zone capital income transfers. These different versions are used to study adjustments facing asymmetric shocks. By comparison, it is possible to estimate stabilization coefficients due to foreign capital income and intra-zone credit.

Two results can be underlined.

-Foreign assets holding has a stabilising role but the capital income stabilising coefficient seems smaller than the one obtained by the “risk sharing” approach. (from 1 % to 6% at medium term for a share of foreign assets close to what is observed). This stabilization coefficient can only be higher (from 5% to 16%) for a share of foreign assets up to 80% which is not realist.

-On the opposite, foreign loans (intra-zone credit) seem to have no specific stabilization effects. Models with, or without, foreign financing inside the monetary union give the same results. This is due to the credit mechanism in a monetary union and to the key role played by refinancing by the Central Bank. Inside a monetary union, domestic credit and foreign credit from an other member of the Union are of the same type. There is no increase of the stabilization coefficient to expect from development of intra-euro zone credit. This conclusion appears opposite to Asdrubali et al. (1996, 2004, 2007) conclusions and to the ECB and European Commission recent declarations.

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Annex: The model

Equilibrium of goods

$$(1) YN = CN + IN + GN + XN - IMN$$

$$(2) YS = CS + IS + GS + XS - IMS$$

where Y=GDP, C=consumption, G=public expenditures, X=exports, M=imports

Households

Disposable income

$$(3) YDNh = WN + id*BDN(-1) + BNN(-1) + BNS(-1) + DIVNNh + DIVNSh - TN$$

$$(4) YDSh = WS + id*BDS(-1) + BSS(-1) + BSN(-1) + DIVSSh + DIVSNh - TS$$

$$(5) YHSNh = YDNh + CGNh$$

$$(6) YHSSh = YDSh + CGSh$$

with YDh= households' disposable income, YHSNh= Haigh Simon disposable income with capital gains (CGh), W= wages, B(-1)= interest on domestic and foreign bonds, id*BD(-1)= interests on bank deposits received by households, DIVh= dividends received by households from domestic (DIVNN or DIVSS) and foreign equities (DIVNS or DIVSN), T=income taxes

$$(7) TN = \theta * (WN + id*BDN(-1) + BNN(-1) + BNS(-1) + DIVNNh + DIVNSh)$$

$$(8) TS = \theta * (WS + id*BDS(-1) + BSS(-1) + BSN(-1) + DIVSSh + DIVSNh)$$

Consumption

$$(9) CN = a_0 + a_1 * YHSNh + a_2 * VHN(-1)$$

$$(10) CS = a_0 + a_1 * YHSSh + a_2 * VHS(-1)$$

VH= households' wealth

Households balance

$$(11) dBDN = YDNh - CN - pbN*dBNN - pbS*dBNS - peN*dENNh - peS*dENSh - dHNh$$

$$(12) dBDS = YDSh - CS - pbS*dBSS - pbN*dBSN - peS*dESSh - peN*dESNh - dHSh$$

pb= bonds prices, B= bonds, BD= bank deposits, E= equities, H= Central Bank currency. When there are two country symbols (N and S), the first denotes the country in which the asset is sold, the second the country from which the asset originates.

Capital gains on equities and bonds held

$$(13) CGNh = dpbN*BNN(-1) + dpbS*BNS(-1) + dpeN*ENNh(-1) + dpeS*ENSh(-1)$$

$$(14) CGSh = dpbS*BSS(-1) + dpbN*BSN(-1) + dpeS*ESSh(-1) + dpeN*ESNh(-1)$$

Households' balance sheet

$$(15) VHN = BDN + pbN * BNN + pbS * BNS + peN*ENNh + peS*ENSh + HNh$$

$$(16) VHS = BDS + pbS * BSS + pbN * BSN + peS*ESSh + peN*ESNh + HSh$$

(which gives $dVHN = YDNh - CN + CGNh = \text{households saving} + CGNh = YHSNh - CN$)

Households' bonds demand

$$(17) pbN*BNN/VHN = v_0 + v_1 * rbN - v_2 * rbS - v_3*id - v_4*reN - v_5*reS$$

$$(18) pbS*BNS/VHN = v_0 + v_1 * rbS - v_2 * rbN - v_3*id - v_4*reN - v_5*reS$$

$$(19) pbS*BSS/VHS = v_0 + v_1 * rbS - v_2 * rbN - v_3 * id - v_4 * reN - v_5 * reS$$

$$(20) pbN*BSN/VHS = v_0 + v_1 * rbN - v_2 * rbS - v_3 * id - v_4 * reN - v_5 * reS$$

where rb = interest rate on bonds, id = interest rate on bank deposits, re = rate of return on equities

Households' equities demand

$$(21) peN*ENNh/VHN = v_0 - v_1 * rbN - v_2 * rbS - v_3 * id + v_4 * reN - v_5 * reS$$

$$(22) peS*ENSh/VHN = v_0 - v_1 * rbN - v_2 * rbS - v_3 * id - v_4 * reN + v_5 * reS$$

$$(23) peS*ESSh/VHS = v_0 - v_1 * rbN - v_2 * rbS - v_3 * id - v_4 * reN + v_5 * reS$$

$$(24) peN*ESNh/VHS = v_0 - v_1 * rbN - v_2 * rbS - v_3 * id + v_4 * reN - v_5 * reS$$

Cash demand

$$(25) HNh = \lambda_0 * CN$$

$$(26) HSh = \lambda_0 * CS$$

Transaction demand of money

Firms

$$(27) UPN = YN - WN - r_l * LN(-1) - DIVN + DIVNNe + DIVNSe$$

$$(28) UPS = YS - WS - r_l * LS(-1) - DIVS + DIVSSe + DIVSNe$$

UP = undistributed profit, L = loans, r_l = interest rate on loans, DIV = distributed dividends, $DIVe$ = received dividends on equities held

Fixed investment

$$(29) IN^d / KN(-1) = k_1 * UPN(-1) / KN(-2) + k_2 * d(YN) / YN(-1) - k_3 * LN(-1) / KN(-1) - k_4 * r_l + k_0$$

$$(30) IS^d / KS(-1) = k_1 * UPS(-1) / KS(-2) + k_2 * d(YS) / YS(-1) - k_3 * LS(-1) / KS(-1) - k_4 * r_l + k_0$$

General determinants of desired fixed investment with profit effect, accelerator effect, negative influence of the debt ratio and credit cost; K = fixed capital stock

$$(31) IN^r = d(LN^s) + UPN + peN * dEN - peN * dENNe - peS * dENSE$$

$$(32) IS^r = d(LS^s) + UPS + peS * dES - peS * dESSe - peN * dESNe$$

I^r =restricted investment determined by the different flows of financing profit, equities and credit rationing from banks L^s

$$(33) IN = \min(IN^d, IN^r)$$

$$(34) IS = \min(IS^d, IS^r)$$

$$IN = IN^r \text{ if } IN^r < IN^d$$

$$IN = IN^d \text{ if } IN^d < IN^r$$

$$(35) d(KN) = IN - \delta * KN(-1)$$

$$(36) d(KS) = IS - \delta * KS(-1)$$

Balance of firms' flows of funds

$$(37) d(LN^d) = IN^d - UPN - peN * dEN + peN * dENNe + peS * dENSE$$

$$(38) d(LS^d) = IS^d - UPS - peS * dES + peS * dESSe + peN * dESNe$$

Determining the flow of new loans dL^d desired by firms by balance of the flow of funds

Firms' equities demand

- (39) $peN * ENNe / (KN + peN * ENNe + peS * ENSe) = f1 * reN - f2 * reS + f3 * (UPN / KN(-1)) + f0$
 (40) $peS * ENSe / (KN + peN * ENNe + peS * ENSe) = f1 * reS - f2 * reN + f2 * (UPN / KN(-1)) + f0$
 (41) $peN * ESNe / (KS + peN * ESNe + peS * ESSe) = f1 * reN - f2 * reS + f3 * (UPS / KS(-1)) + f0$
 (42) $peS * ESSe / (KS + peN * ESNe + peS * ESSe) = f1 * reS - f2 * reN + f3 * (UPS / KS(-1)) + f0$
 Financial capital accumulation related to the rate of return on equities held (re), with a profit rate effect

An alternative specification could be:

$$peN * dENNe / (peN * ENNe)(-1) = f1 * reN - f2 * reS + f3 * (UPN / KN(-1)) + f4 * (LN / (LN + peN * EN + VN))(-1) + f0$$

Equities issued

- (43) $peN * d(EN) / (IN + peN * d(ENNe) + peS * d(ENSe)) = g1 * rl + g2 * (LN / (LN + peN * EN + VN))(-1) + g3$
 (44) $peS * d(ES) / (IS + peN * d(ESNe) + peS * d(ESSe)) = g1 * rl + g2 * (LS / (LS + peS * ES + VS))(-1) + g3$

New issued equities as a percentage of real and financial investment with a positive effect of credit cost and of the debt ratio;

A more simple specification could be used

$$peN * EN / KN = g1 * peN + g2 * rl + g3 * (UPN / KN) + g4$$

or

$$peN * EN / (peN * EN + LN + VN) = g1 * peN + g2 * rl + g3 * (UPN / KN) + g4$$

Rate of return on equities

- (45) $reN = d(peN) / (peN(-1)) + DIVN / (peN * EN)(-1)$
 (46) $reS = d(peS) / (peS(-1)) + DIVS / (peS * ES)(-1)$
 $re =$ rate of return of equities issued; $(reN = reNNe = reSNe = reNNh = reSNh; reS = reSSe = reNSe = reSSh = reNSh)$

(47) $EN = ENNh + ENNe + ESNh + ESNe$

(48) $ES = ESSh + ESSe + ENSh + ENSe$

Balance between equities supply and demand

Firms' net wealth

(49) $VN = KN + peN * ENNe + peS * ENSe - LN - peN * EN$

(50) $VS = KS + peN * ESNe + peS * ESSe - LS - peS * ES$

Firms capital gains

(51) $CGNe = d(peN) * ENNe(-1) + d(peS) * ENSe(-1)$

(52) $CGSe = d(peN) * ESNe(-1) + d(peS) * ESSe(-1)$

which gives the variation of net wealth: $d(VN) = UPN - \delta * KN(-1) + CGNe - d(peN) * EN(-1)$

Income distribution

Wages

(53) $WN = r0 * YN$

(54) $WS = r0 * YS$

(constant share of wages)

Dividends distributed

$$(55) \text{DIVN} = (1 - \text{sf}) * (\text{YN}(-1) - \text{WN}(-1) - \text{rl} * \text{LN}(-2))$$

$$(56) \text{DIVS} = (1 - \text{sf}) * (\text{YS}(-1) - \text{WS}(-1) - \text{rl} * \text{LS}(-2))$$

$$(57) \text{DIVNNe} = \text{DIVN} * (\text{ENNe} / \text{EN})(-1)$$

$$(58) \text{DIVNNh} = \text{DIVN} * (\text{ENNh} / \text{EN})(-1)$$

$$(59) \text{DIVSNe} = \text{DIVN} * (\text{ESNe} / \text{EN})(-1)$$

$$(60) \text{DIVSNh} = \text{DIVN} * (\text{ESNh} / \text{EN})(-1)$$

$$(61) \text{DIVSSe} = \text{DIVS} * (\text{ESSe} / \text{ES})(-1)$$

$$(62) \text{DIVSSh} = \text{DIVS} * (\text{ESSh} / \text{ES})(-1)$$

$$(63) \text{DIVNSe} = \text{DIVS} * (\text{ENSe} / \text{ES})(-1)$$

$$(64) \text{DIVNSh} = \text{DIVS} * (\text{ENSh} / \text{ES})(-1)$$

Government

Budget balance

$$(65) d(\text{BTN}) = \text{GN} + r * \text{BTN}(-1) + \text{BN}(-1) - \text{TN} - \text{TBN} - \text{T€BN} - \text{pbN}d\text{BN}$$

$$(66) d(\text{BTS}) = \text{GS} + r * \text{BTS}(-1) + \text{BS}(-1) - \text{TS} - \text{TBS} - \text{T€BS} - \text{pbS}d\text{BS}$$

where BT= Treasury bills, T=income taxes, TB= tax paid by Commercial Banks, T€B= tax paid by the Central Bank, r= interest rate on Treasury bills, B= interest on bonds, pbdB= bonds issued by government

Treasury bills held by Commercial Banks of both countries

$$(67) d(\text{BTN}) = d(\text{BTNN}) + d(\text{BTSN})$$

$$(68) d(\text{BTS}) = d(\text{BTNS}) + d(\text{BTSS})$$

$$(69) \text{BTSN} = (\text{XN} / \text{YN})(0) * \text{BTN}$$

$$(70) \text{BTNS} = (\text{XS} / \text{YS})(0) * \text{BTS}$$

Bonds purchased by domestic and foreign households

$$(71) d\text{BN} = d\text{BNN} + d\text{BSN}$$

$$(72) d\text{BS} = d\text{BSS} + d\text{BNS}$$

$$(73) \text{pbN} = 1 / \text{rbN}$$

$$(74) \text{pbS} = 1 / \text{rbS}$$

rb= interest rate on bonds, pb= bonds price

Public debt

$$(75) \text{DN} = - \text{BTN} - \text{pbN} * \text{BN}$$

$$(76) \text{DS} = - \text{BTS} - \text{pbS} * \text{BS}$$

D= public debt in stock

Banking system

Bank profit and tax

$$(77) \text{PBN} = (1 - \theta b) * (\text{rl} * \text{LNN}(-1) + \text{rl} * \text{LNS}(-1) + \text{rl} * \text{BTNN}(-1) + \text{rl} * \text{BTNS}(-1) - \text{id} * \text{BDN}(-1) - \text{ib} * \text{RFN}(-1))$$

$$(78) \text{TBN} = \theta b * (\text{rl} * \text{LNN}(-1) + \text{rl} * \text{LNS}(-1) + \text{rl} * \text{BTNN}(-1) + \text{rl} * \text{BTNS}(-1) - \text{id} * \text{BDN}(-1) - \text{ib} * \text{RFN}(-1))$$

$$(79) \text{PBS} = (1-\theta b) * (r l * \text{LSS}(-1) + r l * \text{LSN}(-1) + r * \text{BTSS}(-1) + r * \text{BTSN}(-1) - \text{id} * \text{BDS}(-1) - \text{ib} * \text{RFS}(-1))$$

$$(80) \text{TBN} = \theta b * (r l * \text{LSS}(-1) + r l * \text{LSN}(-1) + r * \text{BTSS}(-1) + r * \text{BTSN}(-1) - \text{id} * \text{BDS}(-1) - \text{ib} * \text{RFS}(-1))$$

TB= tax paid by Commercial Banks, rl= interest rate on loans, id= interest rate on bank deposits, ib= key interest of the Central Bank, RF= advances provided without restriction by the Central Bank to Commercial Banks at the rate ib, PB=bank profit

Credit rationing

$$(81) d\text{LN}^s = \alpha n_1 (\text{UPN}/\text{KN}-1) - \alpha n_2 (\text{LN}-1/\text{KN}-1) + \alpha n_3$$

$$(82) d\text{LS}^s = \alpha s_1 (\text{UPS}/\text{KS}-1) - \alpha s_2 (\text{LS}-1/\text{KS}-1) + \alpha s_3$$

Supply of credit by banks depends of the financial fragility of firms resumed by two parameters, the rate of profit (describing the ability of firms to face debt commitments) and the debt to capital ratio (as a proxy of firms' financial soundness).

$$(83) d\text{LN} = \min (d\text{LN}^d, d\text{LN}^s)$$

$$(84) d\text{LS} = \min (d\text{LS}^d, d\text{LS}^s)$$

$d\text{LN} = d\text{LN}^d$ if $d\text{LN}^d < d\text{LN}^s$ (demand smaller than supply)

$d\text{LN} = d\text{LN}^s$ if $d\text{LN}^s < d\text{LN}^d$ (credit rationing)

Share of loans supplied by domestic and foreign banks

$$(85) d\text{LN} = d\text{LNN} + d\text{LSN}$$

$$(86) d\text{LS} = d\text{LSS} + d\text{LNS}$$

$$(87) \text{LSN} = (\text{XN}/\text{YN})(0) * \text{LN}$$

$$(88) \text{LNS} = (\text{XS}/\text{YS})(0) * \text{LS}$$

Banks balance

$$(89) d\text{RFN} = d\text{HN} + d\text{LNN} + d\text{LNS} + d\text{BTNN} + d\text{BTNS} - d\text{BDN} - \text{PBN}$$

$$(90) d\text{RFS} = d\text{HS} + d\text{LSS} + d\text{LSN} + d\text{BTSS} + d\text{BTSN} - d\text{BDS} - \text{PBS}$$

$$(91) \text{HN} = \varepsilon * \text{BDN}$$

$$(92) \text{HS} = \varepsilon * \text{BDS}$$

H= reserve requirements in high powered money that do not provide interest payments and represent a fixed share of bank deposits

$$(93) d(\text{VBN}) = \text{PBN}$$

$$(94) d(\text{VBS}) = \text{PBS}$$

VB= Bank net wealth whose variation equals bank profit

Central Bank

$$(95) \text{T€B} = \text{ib} * (\text{RFN}(-1) + \text{RFS}(-1))$$

$$(96) \text{T€BN} = \text{T€B} * (\text{YN}/(\text{YN} + \text{YS}))$$

$$(97) \text{T€BS} = \text{T€B} * (\text{YS}/(\text{YN} + \text{YS}))$$

The Central Bank pays taxes equal to its profit which are shared between the two national governments

$$(98) \text{H} = \text{HNh} + \text{HSh} + \text{HN} + \text{HS}$$

Which gives:

$$dH = dRFN + dRFS$$

$$VHN + VN + VHS + VS + DN + DS + VBN + VBS = KN + KS$$

(not to be written)

Interest rates

$$(99) \quad rl = ib + m1b$$

$$(100) \quad id = ib - m2b$$

$$(101) \quad r = rl$$

$$(102) \quad rbN = r$$

$$(103) \quad rbS = r$$

To simplify interest rate on loans (rl) is supposed equal to the key interest rate of the Central Bank (ib) plus a constant mark up. To realize profits, banks apply a spread between the key rate and the rate on deposits (id). Interest rates on Treasury bills (r) and on bonds (rb) are supposed equal to rl .

Foreign trade

$$(104) \quad \log(IMN) = \mu_0 + \mu_{1n} * \log(YN)$$

$$(105) \quad \log(IMS) = \mu_0 + \mu_{1s} * \log(YS)$$

$$(106) \quad XN = IMS$$

$$(107) \quad XS = IMN$$

Volume effect only

107 equations for 107 endogenous

YN, CN, IN, XN, IMN, YDNh, WN, TN, YHSNh, UPN, BDN, BNN, BNS, DIVNNh, DIVNSh, CGNh, CGNe, VHN, ENNh, ENSh, HNh, IN^d, IN^f, pbN, peN, rbN, reN, LN^s, LN^d, LN, DIVN, DIVNNe, DIVNSe, VN, KN, EN, ENNe, ENSe, DN, BTNN, BTSN, BTN, BN, TBN, T€BN, PBN, LNN, LNS, RFN, HN, VBN

T€B, H, r, rl, id

GN, GS and ib exogenous

Table 2: Transaction matrix

	HousN			Firms N			GvtN	BankN			HousS			Firms S			GvtS	Bank S			Central Bank		Tot
GoodsN	-CN			+YN			-IN	-GN			-XN + IMN												
GoodsS	-XS + IMS										-CS			+YS			-IS	-GS					
Wages	+WN			-WN							+WS			-WS									
Int L				-rILN-1				+rILNN-1									+rILSN-1						
								+rILNS-1						-rILS-1			+rILSS-1						
Int BD	+idBDN-1							-idBDN-1			+idBDS-1						-idBDS-1						
Int RF								-ibRFN-1									-ibRFS-1			+ib(RFN-1+RFS-1)			
Int B	+BNN-1						-BN-1				+BSN-1												
	+BNS-1										+BSS-1						-BS-1						
Int BT							-rBTN-1	+rBTNN-1									+rBTSN-1						
								+rBTNS-1						-rBTS-1			+rBTSS-1						
Div	+DivNNh			+DivNNe							+DivSNh			+DivSNe									
				-DivN																			
	+DivNSh			+DivNSE							+DivSSH			+DivSSE									
														-DivS									
Tax	-TN						+TN				-TS						+TS						
							+TBN	-TBN									+TBS			-TBS			
							+T€BN										+T€BS					T€B	
Profit				-UPN			+UPN				-UPS			+UPS						T€B		0	
								-PBN			+PBN						-PBS			+PBS		0	
BD	-dBDN							+dBDN			-dBDS						+dBDS						
HPM	-dHNh							-dHN			-dHSh						-dHS			+dH			
L				+dLN				-dLNN									-dLSN						
								-dLNS						+dLS			-dLSS						
RF								+dRFN									+dRFS			-dRFN-		dRFS	
Bonds	-pBNdBNN						+pBNdBN				-pBNdBBSN												
	-pBSdBNS							-pBSdBSS						+pBSdBBS									
BT							+dBTN	-dBTTN									-dBTSN						
								-dBTNS						+dBTS			-dBTSS						
Equit	-p _{eN} dENN _h			-p _{eN} dENN _e							-p _{eN} dESN _h			-p _{eN} dESN _e									
				+p _{eN} dEN																			
	-p _{eS} dENS _h			-p _{eS} dENS _e							-p _{eS} dESS _h			-p _{eS} dESS _e									
														+p _{eS} dES									
Tot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	