A modified golden rule for the Euro area

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Abstract

As is assessed by statistical facts, unified financial criteria did not succeed in making real sectors converge in the Euro area. Labour markets and welfare states remain specific. That is why debt is split up into allocation, redistribution, refinancing and stabilisation functions. Redistribution and refinancing are balanced in the long run in a ricardian feature because the first one is mainly non-market and the financial assets are considered as derivatives and as such not as real wealth. So the Keynesian usual policy-mix is extended with a prudential policy, which consists in guaranteeing a share of financial assets, in stabilising the debt of the stabilisation function and in refinancing it by the central bank. A new macroeconomic model is built without a LM curve. Coordination concerns stabilizing budgetary policy but it is insufficient to attain full employment and resolve adverse financial shocks, because of the long term relative country-risk premium. A fiscal federalism affected to environment saving and employment enforcing and a coordination of non-market social security systems are necessary. The latter ones can only be implemented in a Nash bargaining context with non-transferable utility.

Résumé court

Comme le montre les données postérieures à la crise, des critères financiers unifiés n'ont pas réussit à faire converger les économies de la zone euro. Les marchés du travail et les Etats providence restent spécifiques. C'est pourquoi nous avons décomposé la dette selon des critères non financiers qui isolent les fonctions d'allocation, de répartition, de refinancement et de stabilisation. La répartition et le refinancement sont traités de manière ricardienne et équilibrés à long terme parce que la première est en grande partie non marchande et le second constitué d'actifs financiers que nous considérons comme des actifs dérivés et non comme une richesse réelle. La politique mixte keynésienne est élargie avec une politique prudentielle qui consiste à garantir une partie des actifs financiers, à stabiliser la dette de la fonction de stabilisation et à la refinancer par la banque centrale. Un nouveau modèle macroéconomique sans courbe LM est construit. La coordination concerne les politiques budgétaires de stabilisation. Elle ne permet pas d'atteindre le plein emploi et d'annuler les chocs financiers adverses en raison de la prime de risque-pays relative. Il faut ajouter du fédéralisme fiscal centré sur la substitution des facteurs capital-travail-environnement et la coordination des systèmes de sécurité sociale. Ces dereniers ne peuvent se faire que dans un contexte de marchandage de Nash sans utilité transférable.

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I. Introduction

The financial crisis has lead to big recessions, such that governments had to borrow in order to guarantee most financial assets with acquisitions or refinancing (USA, Ireland), to maintain activity of firms (decrease of social security contributions in France), to finance the welfare state (rents, basic welfare benefits) and to sustain demand (automatic stabilisers).

The increase of deficits and debts gave rise to two strategic discourses. New liberals argue that activity depends generally speaking on supply conditions and thus for each country on its competitiveness within Europe in a fixed exchange regime and with the rest of the world in a flexible exchange regime. Deficits and public debts must be reduced quickly because they cripple competitiveness. Public debts increase the interest rate that increases the user's cost of capital. Deficits induce higher taxes increasing costs, discouraging labour and distorting demand. The reduction of social expenditures and public goods provision would circumvent these two drawbacks. Insurance and private firms under public contracts could efficiently accomplish these functions.

Social democrats consider that putting competitiveness in the first place only exacerbates external economic wars, biases social competitiveness towards the bottom and diverts from more efficient cooperative solutions. This renouncement not only leads to question the European social model but also increases recessive phenomenon by depressing overall demand and compelling countries to follow suite the model of those in excess supply which they try to export in an agonistic way. Deficits and public debts are countercyclical. The return to the preceding activity and tax increase stabilise debt. The increase of the degree of utilisation of production factors balances the taxes and interests costs of debt and stabilises the international investment position. The reduction of public debt should be slow and planned and interest rate lowered. Public debts should be guaranteed by the central bank to allow the different countries cheap financing considering positive external effects (stabilisation of demand, infrastructure investment, education and health).

These two positions are clearly incompatible and mythical because they want to resume the economic policy by the size or the function of government, considered either positive or negative. Despite the experience and the theorisation of the interwar crisis, economic discourses of the day seems without a past as if knowledge would not be cumulative. Traditional macroeconomics is no more transmitted, no more protected. So old an opposition between keynesian and monetarists, eventhough it should be reviewed, seems meaningless. Very often the threatening feature of economic statements is unseen. Hypotheses are hardly discerned behind the formalism that naturalises the discourse. Ordoliberalism is also a classification of tasks and a threatening command. So it has appeared in macroeconomics two sorts of statements: the very formalized ones little concerned with reality and the most blind common sense. This dichotomy is more and more disavowed. Discourses about crisis make think about this tragedy in the middle of the 90' when a funicular caught fire in the middle of a tunnel in an Austrian ski resort. A later inquiry was lead with all the precision and skills that were allowed by wisdom and with the required intellectual probity. It shed light on the hazardous chain of accidental but cumulative events, which lead two rising wagons to blaze up eventhough they were pulled by a wire cable. When passengers had to flee, they were confronted to an alternative. Should they go down the tunnel, and make through the flames because the fire broke out in the rear of the last wagon, or go up away from the fire? Twelve,

guided by a fireman, chose to go down. Besides some troubles coming from darkness, they emerge in the valley. The others round hundred fifty chose to go up. They all died in carbon monoxide combustion gas. A tunnel, when it is sloping, is like a chimney. What direction would you have chosen? I do not know if I could have been able to write it down. Economists who distinguish between classical and Keynesian regimes know that prescriptions are often opposite according to the situation. Statements about the 2008 crisis reveal the part of conceptions and economic models when it comes to organise economic policy, design the features of the financial system and define final targets.

The debate, at this level of generality, is little relevant because it combines conflicts between different countries with government conceptions. In Europe, north countries (Germany Denmark, Finland, Germany and the Netherlands) refuse or declare to refuse to finance the aberrations of ultraliberals countries, like Ireland, because they do not control their financial system, of the catch up countries, like Spain, because they are too lax with speculative behaviours based on expectations of assets prices increase, of the countries with too high public debts because the border between public and private sectors is interfered with anthropological questions (The Italians of the north do not want to pay for the southerners, the Flemish for the Walloon), of countries hit by political conflicts that solve with decreases of taxes and maintaining expenditures (Greece, United States). Europe is moreover different because it created, after the second world war, an original social security system, which conflicts with financial markets dominance and which put into conflict those who want to consolidate it and those who it to be reduced.

Moreover, if it to avoid the confusion between positive and normative aspects of usual coarse grained approaches, we shall separate themes: intermediaries' risks, size of State, regulation and coordination in an open economy and in a currency area. These old themes must however be rewritten with the knowledge of the new financial techniques in mind and with the knowledge about the distortions that intermediaries introduce, whose size is no more neglectable.

In traditional models, like IS-LM, intermediaries are neutral. It is no more true. Finance development consists in creating ex nihilo derivatives. They are based on the **hybridisation** of primary assets into a **mixed derivative** which value is given by the absence of gains by arbitrage (noarbitrage condition).Then they are **securitized**. Finally risks are redistributed by creating **class of risk assets** to satisfy assets holders. These three phases operation was the scheme to assure the autonomy of the risks taken by financial intermediaries and to made them supported by holders (**originate to distribute model**). When the two categories of risks differ, profits by arbitrage are allowed at the second order for a same given expectation of gain. The amount of the assets of intermediaries (point of view of the borrower) and of their liabilities (point of view of the lender) is thus far bigger than the primary financing necessary to the real economy. As the value of secondary assets depends upon the value of primary assets, the assets are correlated and the variance increase with the square of the size of assets. Moreover, insolvency transmits automatically, from one asset of institution to the other by contiguity leading, by complementarity, to a multiplier effect. Intermediaries introduce by their existence itself, a risk of variance in normal situations and a systemic risk when there are bankruptcies that is no more neglectible. The usual model must be changed by introducing reserve assets that play the same role as monetary reserves in old models. However, to set these reserves by using a target ratio raises three questions. First, to set a target ratio is like to implicitly set the relative size of intermediaries. Second, this ratio can be a management rule or an economic policy rule. Precisely, there should be two ones, the first one being lower than the second one. Third, the macroeconomic guarantee could be defined as the complement to 1 of the second one. So, Then, it must be defined if only the assets bearing no risk premium

should be guaranteed or if a proportion of the overall gross assets, different from the public debt, should be.

To make the question clear, imagine that the bankruptcy risk could be measured by balance sheet ratio capital/overall assets. If the ratio hits this lower limit, agents must restore their reserves. It is procyclical every time the reduction in reserves follows a recession or cascading bankruptcies. In that case, the macroeconomic ratio is the aggregation of microeconomic management ratios. That is the Basle ratio approach. When the ratio is thought as a its complementary form, i.e. the guaranteed assets when a bankruptcy or systemic crisis occur, the point of view is opposite. The reduction of the overall balance sheet must be obtained by a reduction of the ratio in order to guarantee the assets of asset holders. The economic policy has to accept and sometimes encourage the decrease in the ratio. The critical value is now an indicator to activate a policy that becomes countercyclical. Public bodies must endorse the decrease in reserves by financing institutions or acquiring holdings. When there are bankruptcies, they bear losses. To recover these losses is the question of long term guarantee. This policy can be implemented in two different ways. The first one consists in two ratios. The first one is a prudential asset ratio (reserves/assets), the second one is an assurance liability ratio (guaranteed assets/liabilities). The second method consists in creating a public quotation agency that defines the assets (or the share of the assets) which are guaranteed. The aim of this public agency is thus different from private ones, which measure the risk-corrected yields.

In this paper the government policy is designed in such a way that it is neutral with regard to the socio-economic system it founds. This hypothesis implies that the fiscal policy is autonomous of monetary policy, of the social security system and of the organisation of the financial sector. This leads to modify the golden rule of public finance[2]. The wealth of the public sector is 0 by definition and its real or financial assets are computed as a balance. The relevant debt from the point of view of economic policy is the net debt. From the point of view of financial markets, it is the gross debt. The reconciliation within the two induces that the government debt following capital losses of financial intermediaries be cancelled by in the medium term by one of the following means: taxes, swap of corresponding debt or resell of corresponding assets. In this approach recapitalisation could be financed by special bonds different from public debt.

Economic policy is studied with a macroeconomic model, which is Keynesian in the short term and classical in the long term. There are three original points: there is no money (liquidity is neglectible), intermediaries are explicitly introduced and primary real assets (capital and public debt) are the only wealth. Reserves and financial assets are considered as derivatives and are not wealth. Non-insurable macroeconomic risk is explicitly introduced as exogenous risk premiums or adverse shocks on financial assets. There are two ratios: the reserves to capital ratio and the ratio of the debt, which is directly or indirectly financed by the central bank. The first one is an example of the Basle prudential ratio; the second one is an insurance policy ratio which summarise the public guarantee. The first one summarise the risk born by the private sector and the second one the risk born by the public sector.

In a closed economy, public debt is self-financing if the central bank uses a Taylor interest rate reaction function and the government a Leeper fiscal reaction function rule. Stability is easier when there is a tax on risk premium, when they are meaningless because of the guarantee. In this model, debt is legal tender and central bank accounts are automatically balanced by Walras law.

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[2] According to the golden rule of government finance, the resource allocation function can be financed by debt without condition (Musgrave).

In a currency area, with the same model, stability is more complicated. The area is not spontaneously stable eventhough countries use the same feedback rules for the overall area. The solution cannot be found in introducing other targets as the price of assets or the difference between inflation rates. Indeed, even if labour markets work the same way, asymmetrical permanent shocks change distribution of income and inflation specifically. So a long-term stationary equilibrium cannot appear because inflation is different in each country. In other words, some countries become wealthier and wealthier and equilibria, if they exist, are not stationary. There is no stability in a currency area. It is not possible to have simultaneously a common portfolio behaviour (what is usually called perfect mobility of capital), equalisation of inflation rates and stability of the relative wealths. Private agents do not want to hold the debt of the more inflationary country and claim a country risk premium that stabilises production, inflation and wealth. This stabilises the external position to the detriment of the increasing wealth countries, which cannot ever grow rich. This situation is general because it is observe with a WS-PS or conflict model or with a Phillips or wage growth model. To suppress such a country risk premium in a currency area, there must be perfect mobility of labour (Mundell hypothesis) or substitution of capital and labour such that countries specialise (Hecksher-Ohlin hypothesis) or the debt must be perfect substitutes. The latter one is only possible to reach financially by guaranteeing totally the debts.

This statement is different from the response to risk or bankruptcy shocks. In this case, stability is improved by levying a tax on risk premium. It improves the situation of the countries hit negatively by shocks, because the decrease of the cost of the debt gives them more room to manoeuvre under stability conditions. But the taxation of risk premium is confronted with a dilemma. The tax yield should be given to the countries in the best situation bearing no risk premium, because their expansive policy is not hinder by stability constraints and thus more efficient. This dilemma can be compared to the refinancing policy of intermediaries by the central bank. It increases the value of the less risky debt. So does the increase of collaterals available. So the guarantee of public debt, which does not require a control of fiscal policies and is unavoidable. The proposed decomposition of the public debt is a way to go beyond these gross grained remarks.

The paper is organised as follows. Firstly, a modified golden rule is proposed. Secondly, econometric and descriptive analysis is presented to justify the model. Thirdly, the model is described. Lastly, simulation results are commented.

II A modified golden rule for the Euro area

In Keynesian theories of public finance (Musgrave (1959)), there are three functions of economic government: stabilisation, social insurance or welfare and allocation. The Musgrave trilogy has been associated with financing rules and the old golden rule of public finance. The allocation function could be financed by debt and taxes. It produced externalities, which could be valued by a shadow price and thus financed by a sort of Pigovian tax. The latter one could be decomposed into taxes and debt. If households do not consider these investments as real wealth, the optimal debt is zero and the Pigovian tax is an actual tax. If not, there is an optimal share between debt and taxes. Taxes is the non-financial part of financing, which is not financial wealth, and debt the financial share of real wealth. The welfare function had to be balanced because part of it is not contributory and as such belongs to the non-market sector. The stability of debt concerned the stabilisation function only. It was based on two properties. In a Keynesian regime, the expenditures were partly self-financed without an

increase of the income tax rate and surpluses at full employment compensated mean debt over the cycle. It was also based on a policy-mix necessary to obtain full employment and a satisfactory cost of financial resources. But it was hindered by the inefficiency of growth. In a Ramsey model, the interest rate is too high (a discount term is added) compared to the Phelps golden rule, which only provides the same amount of consumption to all generations. Monetary financing allowed reconciling the two. But the disappearance of monetary financing at low interest rates and the autonomous development of financial intermediaries harmed the assumptions.

With the development of finance, intermediaries are no more neglectible. They introduce risks because of the asymmetrical information (adverse selection and moral hazard). So they are not neutral. The usual example is the originate to distribute model with hybridisation of loans, securization, and division into blocks of different classes of risks (senior, mezzanine, equity). The economic crisis of 2008 and the economic policy response of governments, which have endorsed these behaviours afterwards, have revealed the importance of intermediaries, the close and changing link between economic policy and finance and the inadequacy of the Musgrave trilogy.

Secondly, the origin of the debt crisis differs among nations. In Europe, there are three typical cases: Greece, Ireland and Spain. The Greek debt comes from a lack of fiscal resources for three reasons. Moonlighting reduced income taxes, capital flights reduced taxes on wealth (and incomes from wealth) and the government hid its deficits by simple fraud or by counting taxes to collect in the future. The Irish debt comes from the nationalisation or the refinancing of bankrupted financial intermediaries that could not be refinanced by the central bank. The Spanish debt burst out suddenly, when the bubble burst out in the building and civil engineering industry, which stopped the increase of wages, deteriorated social accounts and reduced tax revenues. How to grasp this diversity? Can it be reduced to general risk premiums, which mix private risk, government risk and country risk?

That is why the Musgrave trilogy has to be changed. A fourth function must be introduced: the insurance function, which we have called in another paper, the second order of economic policy. This collective insurance is the guarantee of the State. If insurance is privately obtained, when there is a crisis, there is a capital destruction. If insurance is public, during a crisis, there is an increase of public debt. From the real economy point of view, the losses are the same. So the question is whether this debt is real wealth, whether and how, by whom and at what time these losses should be paid for: taxes, intermediaries, in the short or the long term, bearing in mind that losses depend on "activity".

Our answer is the "modified golden rule of public finance", in the spirit of Musgrave, with four functions, the three original ones and the insurance one. The aim of this rule is to manage stabilisation debt (or Keynesian debt) independently from other choices: social security, financial guarantee and allocation (investment) function. It allows giving some precision on how to implement "fiscal coordination" in a currency area, a question that is not tackled in theoretical studies. The rule is divided in two parts: firstly it defines a decomposition of the overall debt according to budgetary functions and secondly it gives a long run target to manage these debts, in order to encourage the independence of the four functions in the long term.

The stabilisation debt is the overall net debt less the debt that finances the allocation function, less the refinancing of intermediaries (financial sector including pension funds). Universal social benefits (health, family,…) are permanently balanced by a universal income tax (CSG for instance), the pay as you go pension system is also balanced and unemployment benefits belong to stabilisation debt (automatic stabilisers). This partition, which is more functional than accounting, aim at isolating stabilisation from pensions, intermediation and growth.

Self-founded retirement schemes and pay as you go system have not the same guarantee at the aggregate level. Pensions systems are also different according to other criteria's. They can be defined contribution or defined pension, they can be Beveridgian (contributions are considered as taxes) or Bismarckian (the system is contributory and contributions are considered as savings). They can be mandatory or optional. The founded scheme is organised according to a utilitarian criterion because the objective function is proportional to the wealth of agents. The pay as you go scheme is organised by government such that theoretically agents have the same weight. In the first system, the guarantee is made of reserves, which are basically public debt. In the second one, it is non-market and comes from the government. So the public debt is bigger in a founded scheme than in a pay as you go one in order to guarantee pensions. In the short run, if the systems are unbalanced, pension funds have to draw from their reserves and the government to finance the pay as you go system. If we want to isolate the choice of system from the financial policy of government, the public debt must be independent from the border of the two. In other words, there must be no direct public financing to both systems. If there is an unbalance in the short term, they must balanced in the medium term, in the private system with the change of reserves, in the public system by changing the contribution rate, the replacement rate or the length of contributions. Moreover, in the public system, the excess of contributions is used to reimburse the short-term debt; in the private system, a specific taxation is possibly needed, as the cost of public insurance, to reimburse unconditional holdings following insolvency. The coordination with the central bank is not needed. Indeed insurance in the short term relies on private or public financing. In the first case, it is monetary; in the second one, it is budgetary. In the first case it is managed by the central bank (refinancing by the central bank, and setting of the short-term interest rate, clearing houses and auction of CDS in a period of crisis). In the second case it is managed by the exceeding contributions in the public sector, for instance, or the specific taxation (or requirements) of pension funds in the private one.

The question of financial intermediaries (banks, insurance companies and markets) is more complex, because it depends upon the organisation of the financial sector. The coordination between monetary and fiscal policy is needed because of the institutional innovations. If the central bank refinances, the net debt of intermediaries is managed by monetary policy. If not, it is managed by governments. During the recent crisis, the latter ones intervene heavily with loans, acquisitions of shares, even nationalisations. Governments held partly the monetary function, changing the share of risk bearing. The neutrality is now a question of risk bearing. A necessary condition to obtain it is to separate the refinancing from the stabilisation debt. But, as these debts are intricate in the short run, we will see that a medium term target should be added and coordination with the central bank specified.

Historically, the sharing of attributions between the central bank and the State to refinance intermediaries is the result of the past financial organisation in each country. In the old post-war organisation, there was a division of tasks. As a lender of last resort, the central bank managed the macroeconomic financial risk (liquidity, bankruptcy) and the State the real risk of production and unemployment with the stabilisation policy. The development of intermediation has mixed these two risks. In a deregulated economy, agents cannot identify the origin of shocks. Collateral is used in financial and real projects. Cascades of derivatives have blurred information, increasing the correlation between assets, when agents can no more anchor on regulation rules. Furthermore economic responses of governments have increase this confusion. Firstly, central banks broadened the quality of assets they repurchase to all categories, using quotations given by private quotation agencies. Secondly, governments have guaranteed a wide range of assets. Thirdly, this guarantee was obtained in the short run by

loans as by equities (cf. Benassy and alii (2009)). Thus the nature of financial assets and of financial institutions is no more an indicator of real economic expectations or shocks.

So the share of tasks between the central bank and government must be redefined. Actually, pension, refinancing and public goods provision can be financed either by loans or equities. These traditional assets no more characterize risks, because the separation between bank and market activities has disappeared. To redefine them, the notion of public guarantee must be introduced in the macroeconomic modelling. The coordination between the central bank and the government concerns not only the first order (public expenditures and interest rate) but also the second order, i.e. the public guarantee. Each authority could define and announce the assets it guarantees. This could be documented by an autonomous public agency. Quotations are the share of guaranteed assets. The central bank manages refinancing by a generalised haircut. The haircut, that is the excess of collateral, is the complement to unity of the quotation. It only can obtain a private guarantee, such as Basle reserves. The equivalent of haircut for the government can be the rule, that the corresponding refinancing assets should be reimbursed in the long term by taxes or by emitting recap bonds.

Thus, in summary, the modified golden rule is a try to derive economic policy directly from real functions and real wealth, independently from financial regulation.

It can be expressed in the following terms. The stabilisation debt, computed as said before, is the only one that bears no long-term constraint except stability. It is a primary asset, which counterpart is the cumulated budgetary deficit of stabilisation. In the medium term, pension schemes, refinancing and public goods provision is treated separately. This rule has three advantages. Firstly, it isolates pension schemes, which depend upon the ageing of population for instance. Secondly, it isolates intermediaries, which are outsourced in a currency area already. Thirdly, it allows focusing fiscal coordination on Keynesian policies.

But, has this rule a theoretical economic foundation? The answer is partly yes, as far as it can be related to the Ricardian vs Keynesian debate.

The public debt can be qualified according to the Ricardian or Keynesian "behaviour" of the government or the households. The government is Ricardian, if it stabilise debt with expenditures, taxes or other incomes outside any long run target. The households are Ricardian if they think that some category of asset is not real wealth. So if households consider public debt as not real wealth, consistency implies that the government adds a zero long-term target to the stability. But all that depends upon the regime of the economy and on the final targets that are given to economic policy.

In a Keynesian regime, stability is obtained, if the propensity to consume is sufficiently high, by tax revenues, without it being needed to increase the tax rate, because of the increased production. In a classical regime, because production is set by supply, as a function of the real interest rate, stabilising debt requires to add a reaction of expenditures or taxes to the previous debt, the higher the interest rate, the stronger the reaction. This result depends little upon the Ricardian or Keynesian behaviour of households, when the wealth effect is small. If the economic policy do not stabilize debt, markets compute its value according to a forward solution. It is depreciated, but it seldom restores stability, which is a backward solution, except when taxes are lump sum. So stability depends upon regimes, as far as Keynesian debt is concerned. This is no more true for the other functions. The allocation function manages supply. This activity produces, for example, externalities. So it is possible to compute a shadow yield and a corresponding Pigovian tax. It corresponds to the implicit cost of a production factor. Taxes or debt can finance it. The non market value of this activity is the difference between the shadow value of the factor and the corresponding debt. Whether or not, households consider this factor as real wealth or not is an old question, which can be requalified in Ricardian or Keynesian term (or considered out of question). Pension schemes

(whether pay as you go or founded) are an intergenerational transfer (a transfer of income for an individual in a life cycle model). So, at the aggregate level, the wealth of it does not depend upon output. Finally, the refinancing function corresponds to the public insurance and guarantee of assets. It deals with risk bearing. Its first function is to avoid definite bankruptcies that have negative effects, because of irreversibility. Its second function is distributing risks, in a different way as the intermediaries. Its third function is to be countercyclical concerning risks. So its value is not related to production fluctuation, inasmuch as risks are not production related. In this sense, refinancing is not real wealth, as financial reserves are not real wealth, because they are useless as factors of production. Thus, the zero target of the refinancing function is justified because households consider it as not real wealth. The broad guarantee of assets in the short term and the balanced target of this function in the long run is incitative. But it is another question.

III Empirical considerations about the Euro area

Before introducing this extended golden rule of public finance in a Keynesian macroeconomic model, to study economic policy in the Euro area, it is necessary to assess some theoretical hypotheses and empirical features about the Euro area. This is the aim of this section. The two theoretical questions concern whether consumers are Ricardian or Keynesian and how the interest rate on public debt is determined. The two empirical questions are firstly about the link between the rate of growth, public debt and public deficit, and secondly deal about the spontaneous and policy responses of the different countries.

3.1**. Keynes vs. Barro**

Beside the usual crowding out effects, if consumers are Ricardian, when they observe an increase in deficits, they expect an increase in taxes and reduce their expenditures: the multiplier is zero. If they are Keynesian, an increase in deficits means an increase in income and they increase their expenditures: the multiplier is positive. More precisely, consumption with Keynesian features depends upon disposable income with a public wealth effect. With Ricardian features, it depends upon the difference between gross income and public expenditures and the public wealth is nil. Thus Keynesian policies become inefficient and markets claim risk premiums because they are no more financed. But this statement must be precised according to the origin of the deficit, if the extended golden rule is to be used. Four situations can be imagined. In a broad Keynesian regime, there is no debt target but fiscal policy stabilises it in the long term. The "German golden rule" consists in requiring the government to be Ricardian as far as all expenditures are concerned. The target is to remove deficit in the long run, such that the public debt converges to zero because of the stability condition. The "English golden rule" applies this constraint to the debt outside the allocation function only. Our proposed golden rule consists in requiring the constraint to refinancing of intermediaries, pension schemes, and the contributive share of social security. The last part of social security (including unemployment allowances) is merged with the stabilisation function. So the Ricardian feature of consumption does not sum up with the behaviour of agents and an hypothesis about markets (Those who hold debt are not necessarily those who pay taxes) but also refers to budgetary rules and differs with the kind of taxes and expenses.
The Ricardian hypothesis can be tested in including it in a general model:
$C = aY - bT + c(T - G) + dD(-1)$
where C is consumption, Y is income, T are taxes, G are public expenditures and D is debt.
The Ricardian model corresponds to the restrictions $b = c$ and $d = 0$ and the usual model to $c = 0$ and $d > 0$.
This coarse test must nevertheless be refined by discussing deficits, if a more detailed budgetary rule is adopted, and by distinguishing countries. The latter aspect is treated with panel data econometrics on the twelve first « founder » countries. The first aspect is tackled by introducing the rules through different definitions of consumption and taxes, insofar as it is possible with harmonised Eurostat accounts. The coarse golden rule is tested with overall deficits, the British rule is defined with expenditures less investment (and non-fiscal resources), our modified rule removes also investment (allocation function) and capital

transfers (refinancing) and the net lending of social security[3]. In each case, different expenditures are associated with different tax revenues (income tax, excise duties, social contributions).

The estimates concern the Euro area (11 countries, the first twelve, Luxembourg excepted) from 2000 until 2010. The propensity to consume social security benefits is assumed to be equal to unity (see appendix 4). Consumers are Keynesian : public debt has a positive effect, the propensity to save taxes is lower than the propensity to consume primary income (between a third for the VAT and to third for income tax), public expenditures do not crowd out private consumption net of social allowances. Diversity between countries is well explained by fixed effects and a common propensity to spend the public debt. Fixed effects are essential: the variance between countries explains almost all the variance. Thus harmonization of public debts will not lead propensities to consume to converge. On the other hand, private consumption without allowances differs with the origin of public deficit. The multiplier is certainly positive, its diversity among countries is little based on debt, varies little with tax nature (apart from social contributions). Harmonization, neither of tax structure, nor of debts, is likely to make savings rate to converge.

3.2. **Risk premiums and area organisation**

In a classical regime, an increase in debt induces an increase in interest rates, such that the reaction function of the central bank determines the interest rate. In a Keynesian regime the counter-cyclical policy of the central bank influences the interest rate of the public debt. Risk premiums take account of uncertainty but do not change the functioning of model except that the interest rate is risk premium augmented. How are these premiums measured? The assessment of default risk of sovereign states and their rating have a long centennial story. Among indicators that appeared over times, the ratio of debt repayment to total resources, alarm threshold of interest burden or debt itself and the composition of debt. These variables are easily written in national accounts with the ratios interest charges to taxes, interest charges to GDP, debt to GDP and external debt to GDP. The creation of the Euro area renews partly the question, because growth, as we shall see in the next paragraph, is not independent from external balance and position, because policy efficiency after specific shocks depends upon the symmetrical or hierarchical feature of the union. Three determinations of risk premiums can be considered. In the first one, debts are considered as independent as if union does not exist. In the second one, they are related by the union that be symmetrical. In the third one, the union is asymmetrical and risk premiums are defined in relation to a dominating country that plays an anchor role at a second order as in a fixed exchange rate regime at the first order. Without asking whether these descriptions are relevant, the implicit formation of risk premiums can be assessed with econometric panel methods as previously (see appendix 5). In the Euro area, over the period 1999-2010, 10 years public debt interest rates are explained by interest rates to GDP or interest rates to taxes (ability to reimburse), inflation, public deficit to GDP, public debt and overall external wealth to GDP. The symmetry of the area is tackled with three endogenous variables. In the first case, the endogenous variable is the nominal interest rate, in the second one, it is the discrepancy between nominal rates to the mean of the area, in the third one, it is the difference with the German one. The first case is the union as if it were nonexistent, the second one is the symmetrical, the third one is the German dominance.

Broadly speaking, countries have kept their autonomy and the area was not symmetrical from the point of markets: fixed effects, as characteristic of diversity, are important and explain

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[3] Strickly speaking, pensions only; but the difficulty is partly bypassed, because benefits have been substracted.

round 80% of variance; estimates relative to the mean do not improve regressions (sometimes they worsen it). And do not reduce the explanatory power of fixed effects. The difference with Germany give in general better regressions, bearing in mind that fixed effects remain about 50%.

Risk premiums do not depend on inflation, on public deficit, on the interest payments to GDP ratio, which sign is sometimes positive, sometimes negative. It depends positively on the interest payments to taxes ratio, but sometimes this variable changes the sign of the debt to GDP ratio. If the direct effect of interest payments is ruled out, risk premiums depend positively on public debt and negatively on net external wealth.

Estimates over the 2000-2008 years, before the financial crisis, show that country specificity was less clear (fixed effects explain between 20% and 40% of variance), that there was no clear German dominance and that independent countries less tied to the area was a better representation fitted to data. Reimbursement ability (interest/taxes) is a better explanation of risk premium instead of debt itself.

To summarize, financial markets or rating agencies amalgamate sovereign state and country risks. They treated countries symmetrically before the crisis and consider there is a German dominance since, in the sense that Germany is the reference country, with the lowest risk. They seem to compute relative risk premiums accordingly. Fixed effects and the value of debt have become the relevant variables. On this subject, there is no convergence, but divergence.

But these estimates fail to justify the proposed extended golden rule, because debt is difficult to separate into functions with the available data. Moreover social and allocation debt are too small over a long period. Regressions cannot exhibit a special effect on risk premium of social debt measured by the simple accumulation of social deficits or public investment. The effects are too new. This question will be assessed when we shall discuss short-term evolutions.

3.3 Keynesianism vs. Mercantilism

The Euro area was based on the coronation doctrine (the four criteria: inflation, real long-term interest rate, deficit and debt ratios). The question is whether these criteria enforced growth convergence since. Is there a relation between rate of growth, debt and external wealth? The question arises because, as we mentioned before, stability in the long run in a currency area cannot be obtained with constant relative wealth without country risk premiums. Thus, growth rates could diverge according to country specific interest rates including premium, eventhough GDP levels are stabilized.

Countries of the Euro area can be classified into two categories: "Keynesian" countries, which growth is domestic demand sustained and partly financed by foreign capital and "mercantilist" countries, which growth is sustained by net exports and net investment position. To "Keynesian" countries, external "intra-area" deficit matters, while surplus outside union and foreign net wealth are the main explanatory variable to "mercantilist" countries. To the latter ones, surplus results from external specialisation and the former ones deficit comes from internal competitiveness. The intra-area balances can be explained by competitiveness mainly, the extra-area balances by specialisation. Thus these disequilibria have different origins and are to solve with a single policy instrument. The differences in competitiveness inside the area should be solve through exchange rate adjustment or fiscal policy coordination and outside the area they are probably a question of outsourcing and specialisation and should be solved by an investment policy.

Table 1: Correlation matrix (12 countries, 11 years means*)

Variable	Growth rate	Unemployment rate	Inflation	Public debt	Foreign wealth	Real interest rate
Growth rate	1					
Unemployment rate	-0,18 (1,29)	1				
Inflation	+0,38 (6,84)	0,02 (0,02)	1			
Public debt	-0,60 (22,8)	0,42 (8,68)	-0,18 (1,34)	1		
Foreign wealth	+0,35 (5,72)	-0,36 (5,97)	0,29 (3,54)	-0,42 (8,41)	1	
Real interest rate	-0,34 (5,19)	0,15 (0,90)	-0,90 (168,93)	+0,42 (8,57)	-0,58 (20,03)	1

(*) In parentheses, value of Chi-square with 11 degrees of freedom (Wald test), critical values at 1% and 5% confidence level are 5.41 et 2.71. Covariances are estimated as the square root of the product of the coefficients of two regressions. The square of a Student is a Fisher that tends towards a Chi-square.

The rate of growth is positively correlated with foreign wealth, negatively with the real interest rate. On the other hand, there is no correlation between the unemployment rate and the rate of growth. (see table 1 and graphs below). These results comply with usual knowledge about growth rates convergence. The lack of correlation between rate of growth and unemployment rate could be explained by the diversity of level at the beginning of the currency union, the different definition of unemployment and labour laws (part-time) among countries. External wealth is negatively correlated with public debt, eventhough crowding out effect is not obvious (see figure below). Nevertheless, these correlations are misleading (table 1). Indeed, we have checked the classification between Keynesian and mercantilist countries. We regressed growth rates with long term real interest rates, public debt and trade balance. Neither public debt, nor public deficit are significantly different from 0.

The estimates concern the 12 countries of the Euro area over 2000-2010 (see appendix 5). The trade balance defines country classes pretty well: only Italy changes of regime, beginning with a trade surplus and ending with a deficit. The external net investment position has a positive effect on growth to deficit countries only: the more they borrow from abroad, the less is growth. Capital movements act as a financial constraint. The trade balance has a positive effect on surplus countries and a negative effect on deficit countries. It could be interpreted by saying that, in surplus countries, trade surplus is at the origin of growth, and in deficit countries growth is at the origin of deficits. In surplus countries, the overall trade balance, or the trade balance limited to the rest of the world, have a positive effect. In deficit countries, the overall trade balance or the intra-zone balance has a negative effect. Thus the typology could be: mercantilist countries are those, which surplus with the rest of the world induces growth and Keynesian countries those, which growth makes the deficit inside the Euro area (see charts 1 below).

Link unemployment - growth

Risk premiums

Twin wealths
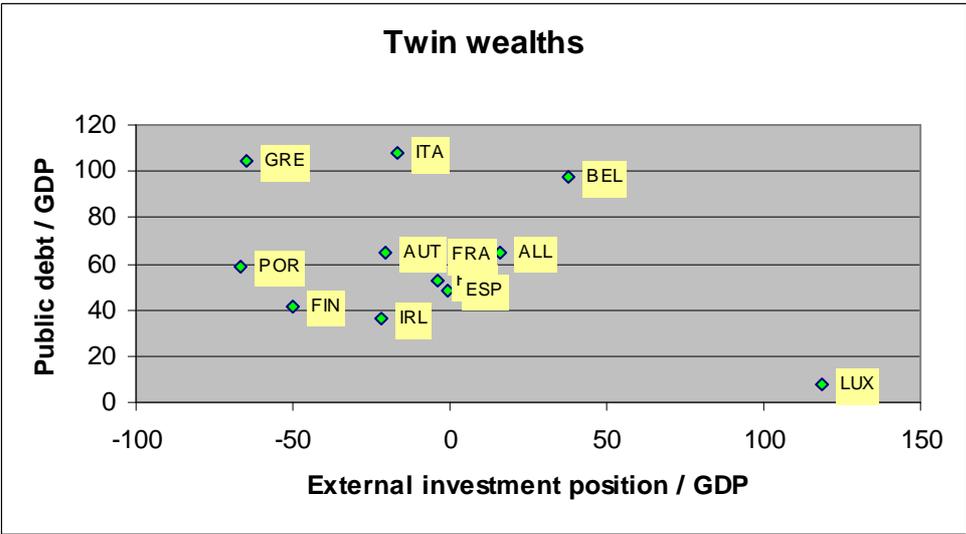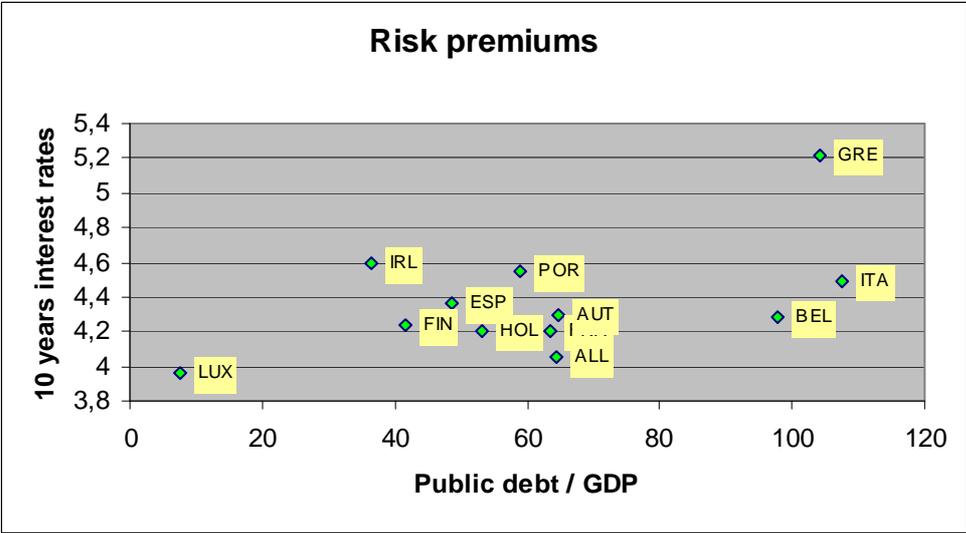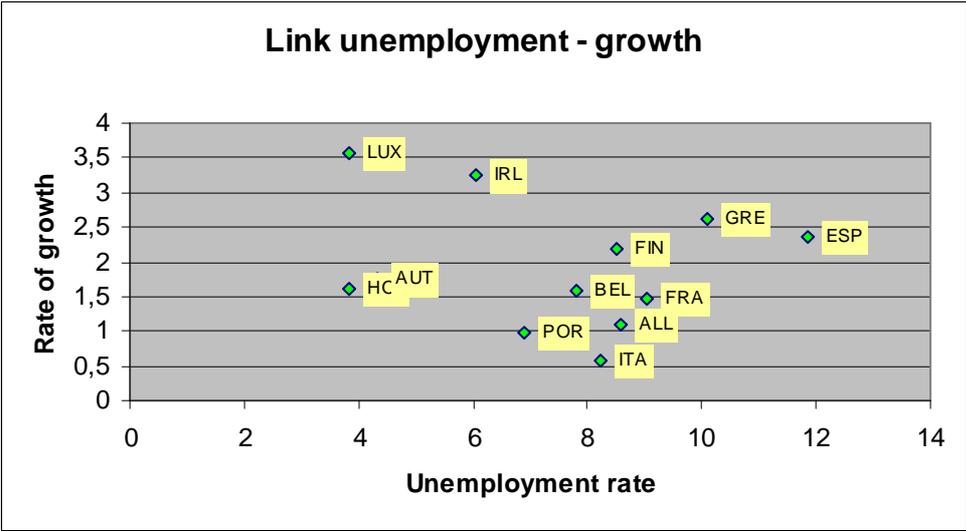
Consequently, the coronation theory, which founded the Euro construction, was a framework to require some convergence as a condition to enter the area. But, its restricted continuation did prove sufficient to ensure convergence afterwards. External trade, the increasing share of finance and risk premiums are to be questioned. This appears when short-term reaction to crisis is observed.

3.4 Short-term responses to shocks

To analyse short-term policy since the 2008 crisis, in the spirit of the extended golden rule, government accounts must be divided into the four functions. Government revenues are divided into taxes, social contributions and other incomes; expenditures into current expenditures (consumption, salaries), social allowances, investment and refinancing (capital transfers). The deficit of the Keynesian function is measured by current expenditures (salaries, consumption, etc…), the deficit of the Welfare function by social contributions less benefits, the deficit of the aggregate allocation and refinancing functions by savings corrected by net borrowing of the Keynesian and welfare functions less investment and refinancing (or capital transfers). As an example, table 2 gives the results for France and Germany in 2010 and compares the deficits changes among Euro area countries and Great Britain, before and after.

Table 2: Approximated golden rule in a national accounts framework (Eurostat)

France (2010)

Income	Expenditures
Taxes : 27.8	Current expenditures : 34.7
	Keynesian deficit : -6.9
Social contributions : 16.7	Social benefits : 17.9
	Social deficit : -1.2
Corrected savings : 4.7	Investment : 3.1
	Refinancing : 0.5
	Allocation and refinancing deficit : +1.1

Germany (2010)

Income	Expenditures
Taxes : 23.7	Current expenditures : 28.4
	Keynesian deficit : -4.7
Social contributions : 15.8	Social benefits : 15.7
	Social deficit : 0.1
Corrected savings : 3.8	Investment : 1.6
	Refinancing : 0.9
	Allocation and refinancing deficit : +1.3

Déficits (-), suplus (+) by function

Country 2007/2010	Overall:deficit	Keynesian deficit	Social deficit	Allocation deficit	Refinancing deficit
Germany	+0.2 / -3.3	-1.9 / -4.7	+0.4 / +0.1	+2.4 / +2.2	-0.7 / -0.9
Austria	-1.0 / -4.7	-2.2 / -5.6	-0.1 / +0.2	+3.6 / +3.4	-2.3 / -2.7
Belgium	-0.3 / -4.2	-0.7 / -4.5	+0.5 / -0.1	+0.4 / +0.8	-0.5 / -0.4

Spain	+1.9 / -9.3	+2.5 / -7.0	+1.3 / -0.2	-0.9 / -0.9	-1.0 / -1.2
Finland	+5.2 / -2.8	-6.1 / -12.9	+4.4 / +2.9	+6.8 / +7.2	+0.1 / 0
France	-2.8 / -7.0	-3.6 / -6.9	+0.2 / -1.2	+1.1 / +1.6	-0.5 / -0.5
Greece	-6.6 / -10.4	-9.6 / -15.6	+0.1 / +1.4	+1.8 / +3.1	+1.1 / +0.7
The Netherlands	+0.1 / -5.3	-2.5 / -6.8	-0.1 / -0.4	+4.7 / +5.2	-2.0 / -3.3
Ireland	+0.1 / -32.4	+0 / -12.7	+0.3 / -0.6	-0.8 / +1.0	+0.6 / -20.1
Italy	+1.5 / -4.4	-1.7 / -5.1	+0.7 / +0.4	+1.0 / +1.2	-1.5 / -0.9
Luxembourg	+3.6 / -1.7	+2.3 / +0.1	+2.3 / +1.5	0 / -2.2	-1.0 / --1.1
Portugal	-3.2 / -9.2	-6.8 / -13.7	+0.8 / +0.4	+2.6 / +3.4	+0.2 / +0.7
United Kingdom	-2.7 / -10.3	-3.6 / -9.8	0 / 0 (?)	+1.5 / +0.7	-0.6 / -1.2

Eurostat databank (dec. 2011), interests, dividends, other transfers should be decomposed, moreover creation and destruction of assets from stock balance sheets introduced in refinancing.

This decomposition is limited by the availability of data. Theoretically social deficits should include pension schemes only, but not the universal allowances. The resources of the allocation and refinancing could not be separated: they are aggregated. But, according to the extended golden rule, the cumulated refinancing should tend to zero - in the absence of new shocks obviously. Thus this presentation is a first approach to assess the rule is rather well-funded.

These tables show firstly that the observation of deficit ratios before the crisis cannot help to forecast or preclude the evolution afterwards and secondly that the deteriorations of public finance are diverse in size and origin. So a typology is a hard task.

We shall considere several criteria.

If the overall deficit is considered, countries can be divided into more than average and less than average deficits. In the first category, we find France, Greece and Portugal; in the second one, Spain, Finland, Ireland and Luxembourg. But if we considere countries, which government balance worsened most since 2007, we find Finland, Ireland, Luxembourg, Portugal and Spain. If deficits are divided according to our rule, there can be extracted, broadly speaking, three taxonomy variables.

Countries that have known strong worsening Keynesian deficits like Spain, Finland, Greece, Ireland and Portugal.

Countries that have known strong worsening of social balance like Spain, Finland, France. On the contrary Germany and Austria (and Greece) restore it quickly.

Countries that have known strong worsening of investment and refinancing deficit like Ireland and partly the Netherlands, inasmuch it is considered that such a deficit was greater than the mean over the whole period.

A more precise investigation can qualify these features. For example, table 2 shows that in France the deficit comes from stabilisation and social balances and in Germany from allocation and refinancing. Thus is appears that Germany implemented a restrictive policy, when France a Keynesian policy. The latter one can be qualified as passive, because it is mainly the result of automatic stabilisers. But the separation between stabilisation balance and social balance is difficult as is shown by table 2, in which it is to be seen that Brittish social balance is by definition equal to 0. In some countries, family benefits, health payments are universal, in others they are based on contribution (Bismarckian), in other ones they are social aid (child care, free medical aid are Beveridgian). Pensions can be Bismarckian or Beveridgian. The social balance is thus dependent on the feature of the system but also

correlated with competitiveness. For example, in a Bismarckian system, where allowances and pensions are contributive, a trade surplus helps to balance social accounts. It increases income and social contributions and thus social allowances that are contribution defined. In a universal system, allowances are not so closely dependant on contributions. They depend on the willingness of some agents to pay rather on income. Thus in a universal system, the correlation between trade surplus and social account balance is weaker. In the Beveridgian system, most of public pensions are residual and the social allowances must be completed by private insurance. The financial systel is of bigger size.

Thus a typology cannot be deduced from apparent independant variables.. If there are such variables, they must be deduced from primary variables and cannot be identified with obvious natural variables.

We suggest three approximative criteria: the evolution of stabilisation public deficit, the contributive social security system or the universal allowance one and the impact of the trade surplus. In this framework, Bismarckian countries have restored the balance of social accounts quickly (Germany, Austria vs. France). The Universal system countries did not (Finland had a surplus social balance and a competitiveness higher than Euro area average, but its social balance has deteriorated).

The last category concerns investment and refinancing deficits that have been important in Spain since the beginning of the period (greater than 4% since 1999) and have worsened specially in Ireland (20% since 2010) and somewhat in the Netherlands, near 5%). It is difficult to separate the two.

Public investment is justified by externalities and its exclusion from deficit by the fact that it is concerned by the first budget cuts during the slump. Excluding investment from public expenditures seems to have been beneficial in the United Kingdom, contrary to Ireland (graphs 2 and 3) and contrary to the preceding 2000-2005 period (see Taigo and Woods (2006)).

The aim of the extended golden rule is to separate of these effects.

Graphique 2 : share of investment in public expenditures
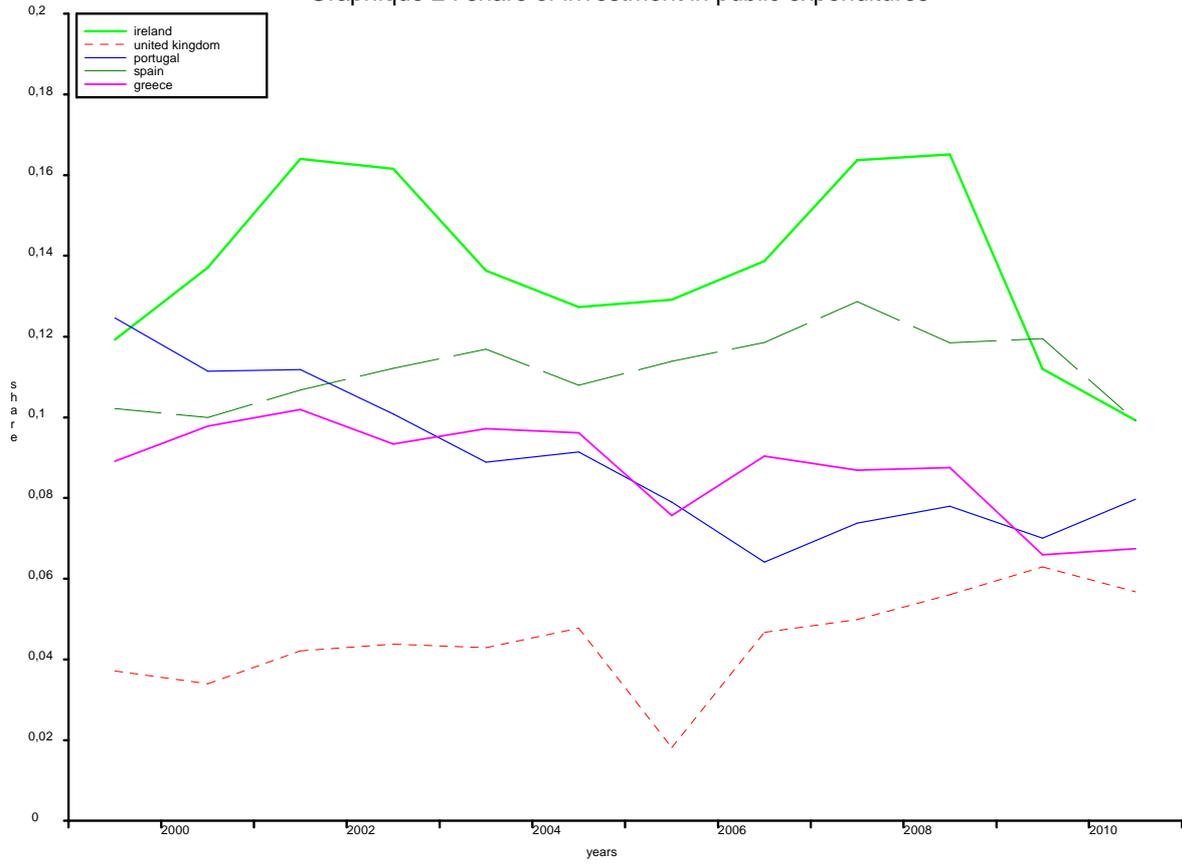
Graph3 : share of refinancing in public expenditures
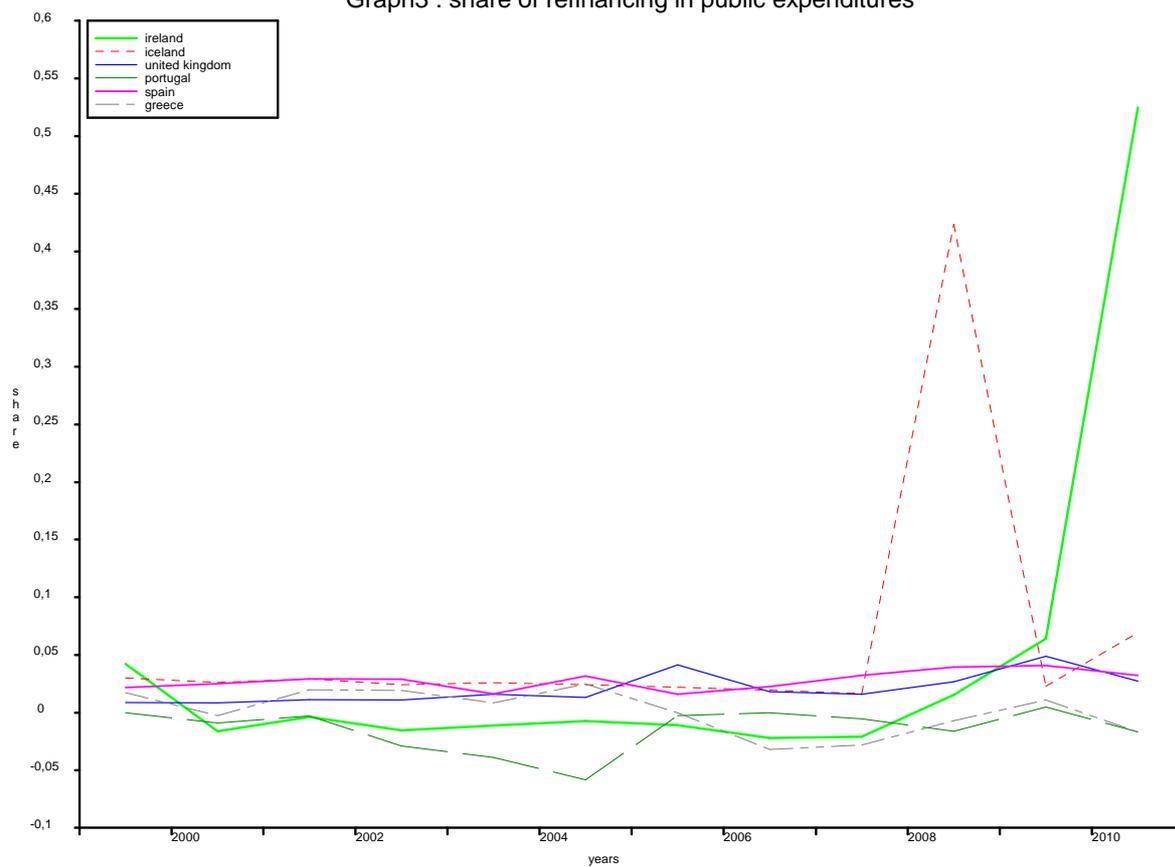
IV. The model

The model is directly inspired of Sterdyniak, Villa (2004) and Bouveret, Sterdyniak and Villa (2007). It focuses on the modified golden rule, the description of economic policy in a currency area with two countries, the description of the intermediaries. It is Keynesian in the short term and classical in the long term. The choice of Keynesian features is justified by preceding empirical results. The dominance of one country at the second order, which is used in some simulations of shocks and policy responses, corresponds also with the econometric results about risk premiums.

4.1. Account framework

The account frame work is based on seven hypotheses :
(1) The border between credit and market has vanished ; intermediaries include banks, insurance companies and markets companies[4].
(2) Government, intermediaries and firms do not hold wealth that is totally owned by households. It is made of the productive capital and of the public debt of stabilisation - that is equal to the cumulated stabilisation deficit (government revenues less capital revenues less expenditures including interest payments): $W = qK + DSC$
(4) Intermediaries are necessary. Households own financial assets, that are derivatives of real assets. These are made substitutes thanks to risk premiums.
(5) Intermediaries hold precautionary financial assets (reserves) that are not produced K_I.
(6) Reserves are not real wealth. They allow to cover risk of production but are not productive.
(7) In such an economy, financial intermediaries provide agents a whole range of assets, from non earning money to bonds and equities that earn a rate, which goes up with the term and the risk. The balance sheet of the central bank is automatically verified by Walras law.

Table 3

Assets				Type of operations	Liabilities			
Public sector	Central Bank	Interme-diaries	Private sector	Assets or ope-Rations	Public sector	Central Bank	Intermed iaries	Private sector
	B^C	B^I		Public debt	B			
K_I^G	K_I^C	K_I	A^m	Finan-cial as-sets and caution capital		A^C	A_I	
qK_E^G		qK_E^I		Produc-Tive capital				

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[4] Capelle-Blancard et Couppey-Soubeyran (2003) assess that specificities of countries do not concern fiancial markets and banks but loans and equities that banks provide (table 5 p. 83).

DSC				Wealth	0	0	0	W

The gross public debt B is held by the central bank B^C and intermediaries B^I. The latter ones hold the productive capital K_E^I and reserves K_I. Their net liabilities A_I is composed of government and central bank financing (loans or shares) K_I^G et K_I^C, of the refinancing of the central bank on the money market for example (a negative part of A^C), of claims of the private sector $A^m - A^C$ (money, credit, bonds). The central bank holds shares on intermediaries K_I^C, its liabilities A^C is composed of money, reserves of intermediaries and bonds held by the private sector. The government finances with the gross debt the cumulative stabilisation deficit DSC, the productive capital K_E^G and the refinancing of the intermediaries K_I^G.

4.2 Modelling shocks and guarantee

When we go from the account framework to the mlodel, the golden consists in substracting public capital from debt, to add it to private capital and to target a zero target for the refinancing, whatever their nature.

$$DSC + K_I^G = B - qK_E^G = F$$
$$K = K_E^I + K_E^G$$

<u>The government guarantee</u> consists in stabilising debt in the long term.

In order to target a zero refinancing in the long term, a tax T_1 must be assigned to this function, that is greater than interest payments. To stabilise the stabilisation debt, taxes (and universal social contributions) are sufficient in a Keynesian regime but a tax on debt must be set in a classical regime.

But the accounting dynamics relies also on <u>the guarantee of the Central Bank</u>. Three cases can be considered.

(i)   The public debt is not guaranteed by the Central Bank. The stability depends not only on the interest rate, the inflation rate, but also on the risk premium claimed by intermediaries.

$$F = (1 + r_g)F(-1) + G - T$$

where F is public debt, G are public expenditures investment excepted, T taxes, $r_G = i - \pi + \delta_G$ the real interest rate on debt, i the nominal interest rate fixed by tyhe central bank, π the rate of inflation and δ_G the risk premium.

(ii)   The Central Bank guarantees beforehand the stabilisation debt but not the refinancing debt, that comes down to create recapitalisation bonds.

$$DSC = (1 + i - \pi)DSC(-1) + G - (T - T_1)$$
$$K_I^G = (1 + i - \pi + \delta_G)K_I^G(-1) - T_1$$

where T_1 are taxes assigned to refinancing such that it vanishes in the long run.

(iii)   The Central Bank guarantees afterwards part of debt through direct purchases or indirect ones, but retrocedes the government the risk premium (private seniorage).

$$F = (l_g(1 + i - \pi) + (1 - l_g)(1 + i - \pi + \delta_G))F(-1) + G - T$$

Keeping in mind that refinancing vanishes in the long run, the afterwards guarantee of financial assets in the long term is equivalent to guaranteeing beforehand stabilisation debt if $l_g = 1$.

In the short run, the two guarantees are equivalent if $l_g = \dfrac{DSC}{DSC + K_I^G}$, i.e. if the central bank guarantees a portion of debt equal to the stabilisation debt.

Beforehand guarantee collides with governments' moral hazard, in the short term, because real interest rates can be negative. But the afterwards guarantee collides with the moral hazard of intermédiaries because it is renounced to go back to the origin of debt. This question cannot be tackled by financial considerations only, because real counterparts of financial assets can't be identified. It can only be by refinancing taxes. In the model, we adopted a model of the third kind, because it is more realistic, since the central bank intervenes afterwards, because it is more flexible, leaving in suspense the choice of the guaranteed share, and because it the richest one : at this stage of reasonning (if the economies would be closed), the Greek crisis concerns the afterwards government guarantee and the Irish crisis the afterwards guarantee of the central bank.

The importance of intermediaries depends on their risk premiums requirements, on intermediation shocks – as systemic risk and asymmetrical information – and on prudential ratios, whether compulsary or optionnal. Their part in economic activity can be discussed with the wealth-counterparts equality that generalises the money-counterpart equality.

$$A_I - K_I = (K_I^C - A^C) + K_I^G + DSC + qK + K_{I,0}$$

Net assets that are not guaranteed by yhe private sector itself (on the lefthand side) are equal to the sum of refinancing by the Central Bank and the government, of the stabilisation debt, of productive capital and a specific shock due to their activity.

The first discussion focusses on prudential policy defining private reserves K_I. Do we need a capital ratio to prevent from insolvency and a monetary ratio to protect oneself from illiquidity ? According to Artus (2011) and numerous authors he mentions, solvency ratios, because they are costly, lead banks to issue more riskier assets beforehand (adverse selection). Thus they are procyclical afterwards, because, during recessions, reserves value decreases $(K_{I,0} < 0)$ and risk increases, such that reserves must be rebuilt up[5]. Intermediaries, to bypass this situation, would not hold enough exceeding liquidities in the short term. Mandatory cash reserves should be reintroduced. This microeconomic argument do not hold in a macroeconomic framework, even besides the fact that cash reserves do not protect against bank runs. Indeed solvency ratios discriminate risks if they are progressive enough. Moreover safe assets are substitutes to central bank refinancing and monetary reserves.

Reserves, when they earn an interest rate, are substitutes to debt and refinancing. On the other hand, the definition of reserves has an impact on activity level in the short term even though they are neutral in the long terme, because they are valued with the godd price if they are monetary and with the productive capital price if they are equities. Moreover, they can earn the riskless interest rate in the first case or the profits rate in the second one. Their yield is the cost of the insurance in the long term. In the second case, they can be valued with Tobin's q. There is a Tobin'q to firms, which value in the long term is equal to unity and a Tobin'q of financial capital, related to productive capital that is greater than unity: $qf = q(1 + K_I / K)$.

Thus the average yield of overall financial capital is smaller than the yield of productive capital without this intermediation cost.

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[5] Ratios encourage the flight to quality in the meaning of Bernanke, Gertler et Gilchrist (1996).

A slow adjustment of reserves to the required (or mandatory) Basle II ratio has been used (see equations (6a, 6b or 6c) in appendix 1, like: $K_I - K_I(-1) = l_1(lqK - K_{I,0})$, where l_1 are lags and l the ratio.

The wealth-counterparts equality shows that prudential counter-cyclical policy is redundant. Generally speaking, it is assumed a specialisation of agents: the central bank do not acquire holdings $K_I^C = 0$ and provides refinancing only A^C. It was the case in Japan, in the USA and the United Kingdom. But intermediate solutions could be imagined. Even though the Central Bank do not acquire shares, it practises haircut, that allows to refinancing risky assets. The guaranties or the collateral are greater than loans in reposit agreements for instance, such that it does not bear too big bankruptcy risks. Failures can prove afterwards bigger than the excess guaranty. This situation is similar to the depreciation of government recap bonds. Actually, the countercyclical insurance policy is shared by the two bodies. Nevertheless, specialisation of agents remains relevant if the Central Bank cedes back the seniorage to States, the losses being a sort of negative seniorage. So it is justified in modelling.

Risk premium on public debt has no justification in a closed economy when government and Central Bank guarantee debt by fiscal stabilisation and debt purchase. Because of Walras law, the balance sheet of the Central Bank is balanced at the interest it sets. If it refuses to finance debt, the interest rate of the debt is bigger than the interest rate that applies to intermediaries. This is a seniorage earned by yhe private sector. Sterilisation of debt is impossible, because the Central Bank shgould reduce refinancing the intermediaries. As debt demand, contrary to money demand is an increasing function of the interest rate, the interest rate had to be lowered, that increased refinancing demand. Sterilisation of debt needs a quantitative constraints on refinancing inspired by free banking, as in a currency board (or a gold standard system)[6]. By thwarting Walras law, all chances to generate dynamic instability are gathered, which symptoms are vivergence of interest rates. The refinancing of debt by the Central Bank is indeed the instrument to guarantee debt as a final target. In this case there is no bankrupcy of a sovereign state in a closed economy or in a flexible exchange rate regime. The risk premium is explained by game theory and is exogenous here. Accomodating Keynesian policies conbsists in increasing financing when it is issued in order to decrease the risk premium. The policy consisting in fiancing the first Euros and then to intervene less and less as debt approaches the fixed threshold is similar to increase the average risk premium of debt[7].

The equality wealth-counterparts helps to define systemic shocks and counter-cyclical responses. There are two types of shocks: real shocks as bubble busting or bankrupcies $(\Delta q < 0)$ and purely financial shocks $(\Delta K_{I,0} < 0)$. With a passive policy, losses are born by financial assets less reserves (agents who bear losses are not necessarily those who generate them: the equality wealth-counterparts is compatible with the originate to distribute model). Counter-cyclical policy mixes fiscal, monetary and guarantee policies (see Benassy and alii, 2010, pp. 37-39). If assets are guaranteed $\Delta A_I = 0$, the first response is to require a recapitalisation in increasing reserves $(\Delta K_I = -\Delta K_{I,0}(= -K\Delta q) > 0)$. The second policy is government financing by loans, shares, a.s.o. $(\Delta K_I^G = -\Delta K_{I,0}(= -K\Delta q) > 0)$. The

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[6] In the « hard » version of Argentinean currency board, there were three redundant rules if the central bank could not borrow abroad: complete hedging by reserves, no financing of government, no financing of banks. The 100% cover by reserves does not guarantee against exchange crisis of the first kind. The system is stupid. To the exchange crisis, it adds the public debt crisis and the instability of financial intermediaries. The three markets were segmented in dollar guaranteed assets and others Chauvin et Villa).

[7] Leaning with (against) the wind Branson (1984), Turnovsky (1984).

third one is central bank financing $\Delta A^C = \Delta K_{I,0}(= K\Delta q) < 0$. The fouth one is haircut of the central bank: $\Delta K_I^C = -\Delta K_{I,0}(= -K\Delta q) > 0$.

4.3 The model (see appendix 1).

The first hypothesis ensues from the consistency with the golden rule. As the allocation function has been extracted from the government policy, the production function must be homogenous in capital, which is a combination of the public and private one (the so-called AK model). The refinancing debt is converging to zero in the long term, but in the short run, refinancing are used to guarantee financial assets. The usual model of the Keynesian synthesis is thus modified on seven points:
1) There is no LM curve
2) Real capital, and thus supply capacities fit demand in the long term.
3) The of capacity utilisation, which measures the discrepancy between supply and demand, is an endogenous variable, which also allows the demand for the financial wealth (the financial capital) to equalise the productive capital. The Tobin's q is equal to 1 in the long term.
4) Wealth composition is determined by a world portfolio behaviour.
5) Financial assets are derivatives of the productive capital and the public stabilisation debt, which are the only real wealth. They are nor real wealth in themselves, but only as secured with primary assets. Consumers are Keynesian according to the public debt and Ricardian according to refinancing.
6) With fixed exchange rates, a differential premium, as risk premium on public debt) replaces the rate of change of the nominal exchange rate in a flexible exchange rate regime. Such a premium does not appear on private capital because of the globalisation of portfolio behaviour.
7) Economic policy is modelled through a Leeper type reaction function of taxes and/or public expenditures, to stabilise debt in the long term, a Taylor type reaction function of the interest rate and a guarantee share of the public debt by the central bank using for it its refinancing policy.

Before turning to simulation results, let us give two remarks.
Firstly, monetary, fiscal and prudential policies cannot be separated, because of portfolio, capacity and reserves behaviours.
Profits generated by production are determined by income sharing. The financial yield is the sum of these profits, less depreciation, less the cost of intermediation, less the risk premium ang augmented by financial appreciation. If we note γ the share of salaries, δ the risk premium, d the depreciation rate, q the price of capital, K_I reserves, Y production and K productive capital, the financial yield is:
$$TP = \frac{(1-\gamma)Y - (K_I - K_I(-1)) - dK}{q(K + K_I)} - \delta + \frac{\dot{q}}{q}$$
According to portfolio behaviour, this yield is equal to the interest rate corrected by the risk aversion:
$$TP = i - \pi + \delta_G - \frac{1}{h}\frac{F}{F + qK}$$

In the short run, in a Keynesian regime, production Y is set by demand, the interest rate by the central bank, the inflation rate by the wage-price loop. This equation determines the price of capital and its expectation.

In the long term, in a classical regime, production is determined by the real interest rate, inflation by the central bank, income sharing by the wage-price loop, the price of capital is equal to unity.

Let us note $u = Y / \overline{Y} = kY / K$ the degree of capital utilisation, k capital coefficient and l the ratio of prudential reserves. By comparing the two equations, it is obtained the most general relation between the degree of capital utilization, income distribution, the interest rate set by the central bank, the share of debt to productive capital and prudential policy:

$$\frac{u}{k} = \frac{1+l}{1-\gamma}\left[r + \frac{d}{1+l} + \delta + \delta_G - \frac{1}{h}\frac{F/K}{1+F/K}\right]$$

<u>Monetary, fiscal and prudential policies are related in the long term by the productive capital market</u>. The choice of techniques $k(r,\gamma)$ does not call into question the existence of the relation because mark-up, desired salary or taxes hinder income distribution to adjust.

The long term degree of capacity utilisation is interpreted classically: income distribution is modified by the degree of capacity utilisation such that financial capital and debt are truly desired. The degree of capital utilisation is an increasing function of reserves ratio l (cost of intermediation), of the real interest rate r (user's cost), of income distribution (profitability effect) and decreasding of debt/capital ratio (portfolio effect). So, to speak of an optimal ratio between debt and capital, is like to speak implicitly of an optimal degree of capacity utilisation. But, the long term degree of capacity utilisation can only be justified imperfect competition and demand risk. There is no theoretical foundation to a public debt target at the first order. At the second order, income distribution and risks of productive activities are only able to allow deducing it from a pure economic point of view.

Secondly, the government guaranty is a pure question of stability and the guaranty of the central bank a question of refinancing. Thus the Taylor and Leeper reaction functions are both needed. In such a model, the economy goes progressively and without any perception of private agents from a Keynesian to a Classical regime.

The Keynesian rules are the only stable ones. It is not important that the economy be old keynesian or new keynesian featured concerning debt in a homogenous model. Whether prices are rationnally anticipated and a quick variable that jumps or a sluggish variable, the stability conditions of debt are almost the same. Indeed dynamics of debt depend on interest payment that are proportionnal to debt, while profits are a share of GDP. So income distribution is numerically more important, while inflation depends on the degree of capacity utilisation that is a variable without any dimension.

V. The Euro area: learning from simulations

The usual notion of a currency area with non-adjustable exchange rates and incompatibility of budgetary autonomy, portfolio behaviour and stability of relative wealth must be extended. With financial intermediaries and economic policy at the second order, guarantees offered by governments and the central bank must be specified. Firstly, it must be defined the share of public debts that is stabilized in a Keynesian manner and the share that is stabilized in a Ricardian manner. Secondly, it must be defined the share public debt which is financed by the central bank, which influences the average interest rate. Thirdly, it must be defined if the union is conceived as symmetrical or with a dominant country. Finally, it must be defined how risk premiums are suppressed (by taxes?) and at what level prudential ratios are defined.

In the Euro area, the European Financial Stability Fund (EFSF) issues long term bond to a limit equal to the sum of dominant less risky governments guaranties (quotation AAA) and the European Financial Stabilisation Mechanism (EFSM) issues short term bonds guaranteed by the common budget. In an asymmetrical area these institutions cannot be financed by the central bank. The financial aid depends upon the guaranty of « dominating » countries that define riskless debt. Differences between country risk premiums remain as a result of private portfolio decisions. In a symmetrical currency area, these funds could be financed by the central bank. The guaranty no more depends only on dominating countries. The riskless debt is the average debt. The question remains if it is possible to remove the relative risk premium in a symmetrical area. The answer depends on how to solve the incompatibility triangle. If nations remain, relative wealths must be stabilise, this risk premium survives. It can only be removed if public debt are perfect substitutes in portfolios. As it will be seen hereafter, there are two ways to achive it. The strong form, that suppress risk premium in the short term, assumes a total guarantee of debts by the central bank through direct financing. The weak form, that suppress risk premium in the long term only, assumes that stabilisation debt should be refinanced but not refinancing debt.[8]

The private guaranty from reserves is different. Consistency implies that, if refinancing are coordinated, reserves must be raised at the union level, and not according residence. Only after defining these four features, fiscal and budgetary coordination can be broached (the four points are modelled in appendix 1, sections b, c, d, e).

Let us imagine a financial crisis, modelled by a shock, decreasing about 10 (10% of GDP) the nominal value of private assets of country 1, in period 1, followed by a guaranty of assets in period 2 (see table 2). With complete guarantee, the central bank forces its interest rate and wipes out the relative risk premium on debts and inflation rates are equalized, because refinancing are Ricardian treated. It does not matter, whether the area be symmetrical or not, since the central bank makes it symmetrical. Debts of both countries bear equal risk. When the central bank does not guaranty debts, making the union symmetrical by mutualizing debts makes both countries better off, because it reduces the average interest rate: but it does not suppress the differential risk premium. On the other hand, to share government guarantees between currency area countries has no long run effect, because refinancing are, at last, held according to portfolio private sector's behaviour. The same remark applies to the globalisation of prudential ratios. Thus, in the long term, in a currency area, it does not matter, whether public guaranties and private reserves are obtained according to the residence principle (home principle) or the source of income (parent company, subsidiary, branch), because of the internationalisation of portfolio behaviour and of Ricardian feature of redfinancing (see table 2 below).

Table 3: Financial crisis of 10 in country 1, refinancing 10.

Debt	Union	output. 1	Output. 2	Risk prem.	Real int. 1	Real int. 2
Un-	Dominant 2	-0..91	-0.27	0.25	-0.06	-0.29

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[8] In both cases, the Central Bank guarantee becomes complete in the long term, because of the Ricardian treatment of refinancing. The stability of the model requires that substituability of assets in portfolios be not to small and not complete. But if debts are complete substitutes, because of guaranties, but not private assets, stability of the model is preserved. Herein, the semi-elasticities in portfolios is equal to 1. It is as if there were three assets only.

guaranteed						
Un-Guaranteed	Symmetry	-0.73	-0.08	0.25	-0.06	-0.29
Guaranteed	Dominant 2	-0.76	-0.05	0	-0.17	-0.17
Guaranteed	Symmetry	-0.76	-0.05	0	-0.17	-0.17

Complete guarantee of the central bank simplifies the system. Its reaction properties to shocks become symmetrical. Members guaranties become symmetrical. It endows it with an implicit coordination that is Europe compatible, inasmuch risk premiums disapear in the long term.

Characteristics of the area are more crucial in the short run sa can be seen in graphs 3 and 4, which describe the evolutions of output and real interest rate affter shock and guarantee. Recession reduces inflation. The central bank decreases its nominal rate, such that the real interest rate decreases in the medium term. But, in the short term, when country 2 is dominant, the real interest rate increases in country 1 that bears the shock, because of the risk premium, the latter one being reduced much later. The country that bears the shock is in bad shape and the leading country in a more favorable position. When guarantee is symmetrical, the interest rate is the average of both. The situation of the dominated country improves ; the one of the leading country worsens. But, the average situation of the area is better off, because the average interest rate is lower. Thus public debts are stabilised at a higher level.

Graph 4: production in country 1

graph 4 : bankruptcy shock in country 1 according area feature
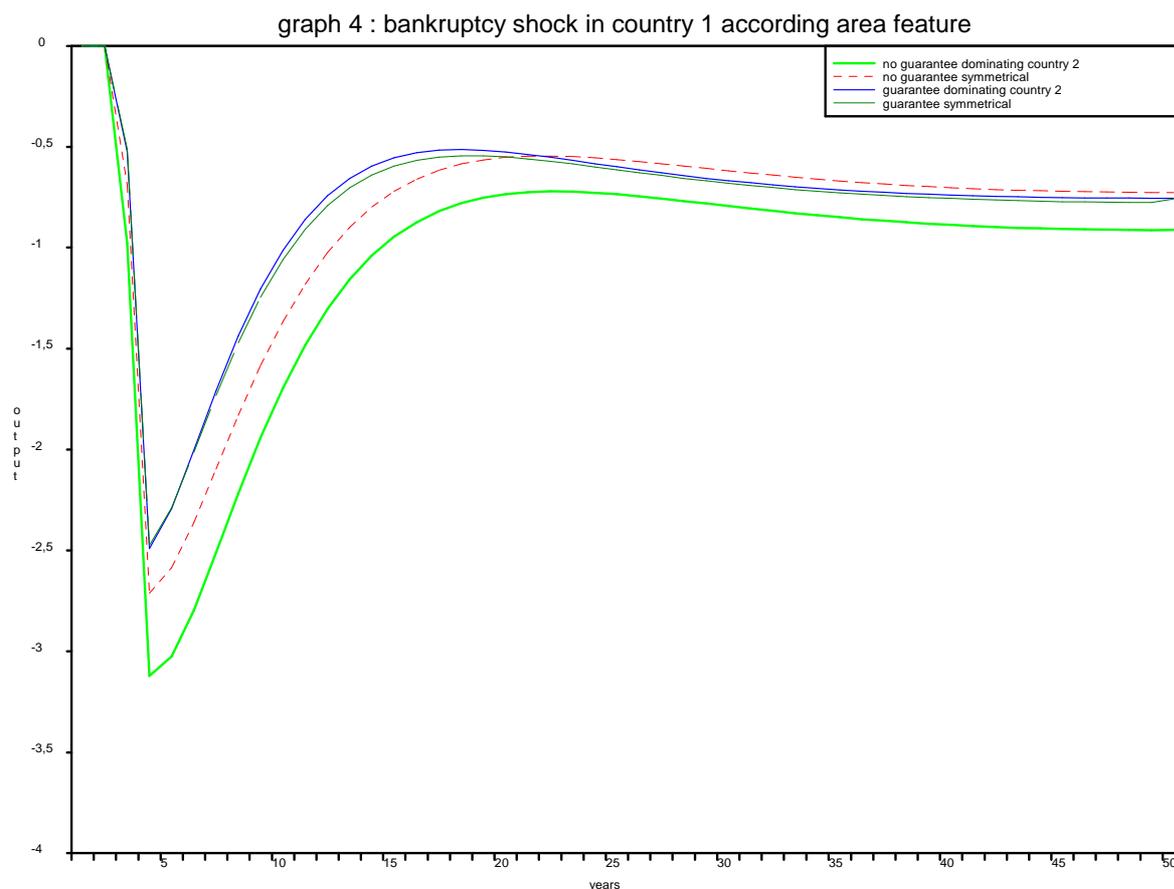
Graph 5: production in country 2

graph 5 : bankruptcy shock in country 1 according to area feature
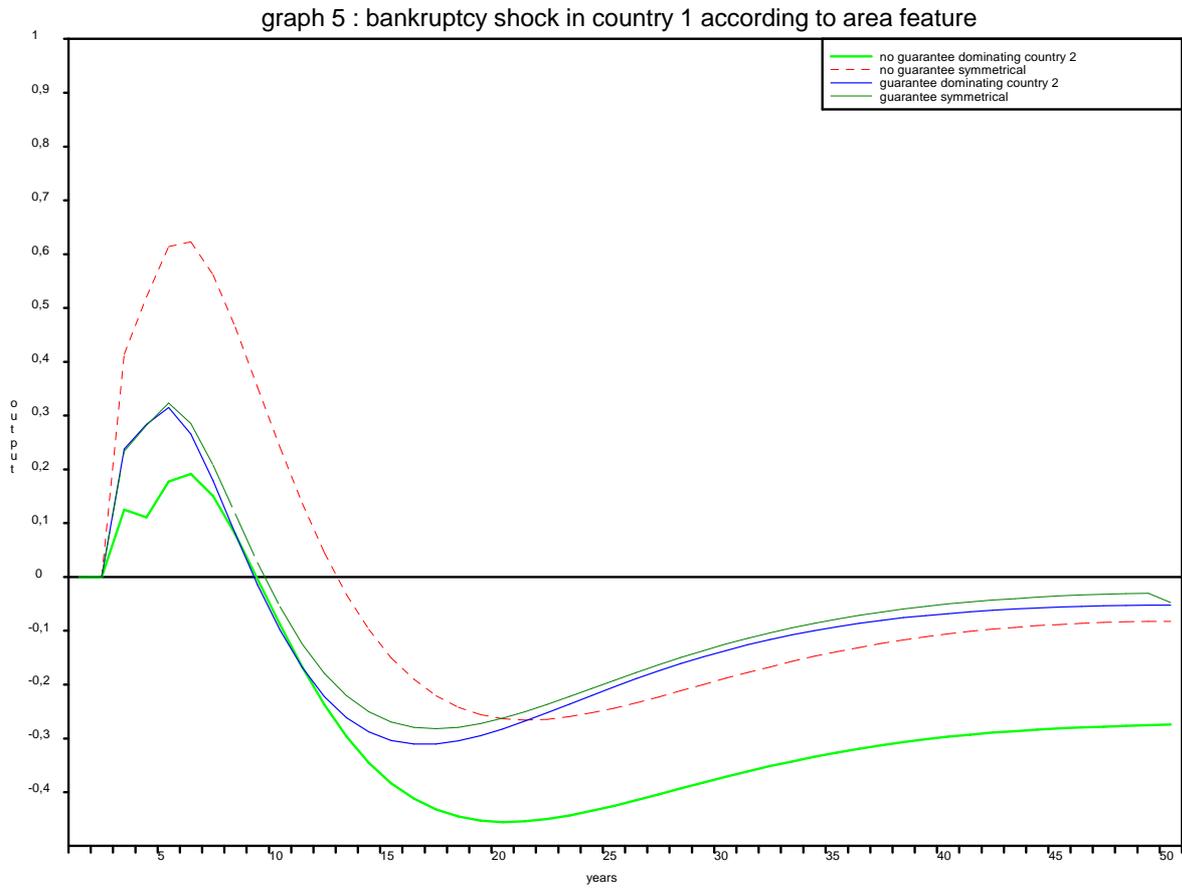

Graph 6: real interest rate in country 1

graph 6 : bankruptcy shock in country 1 according to area feature
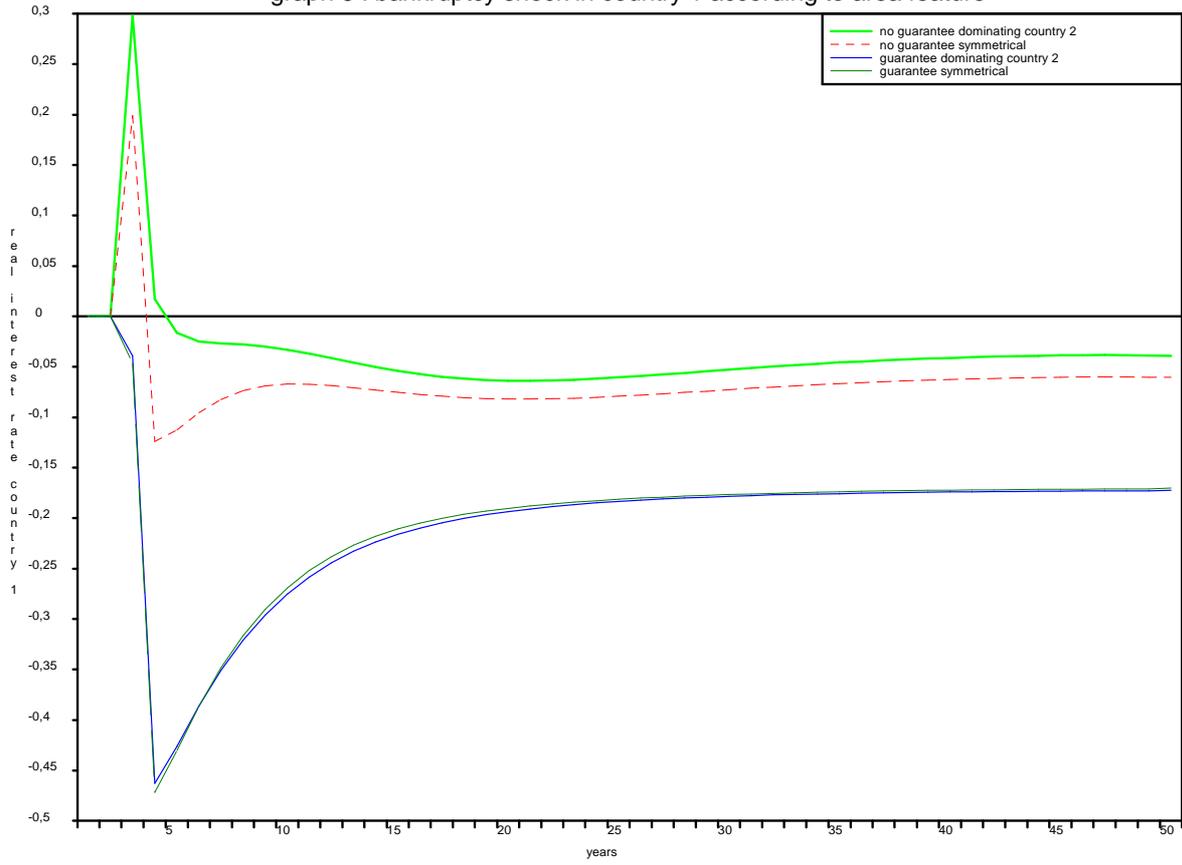
Graph 7: real interest rate in country 2

graph 7 : bankruptcy shock in country 1 according area feature
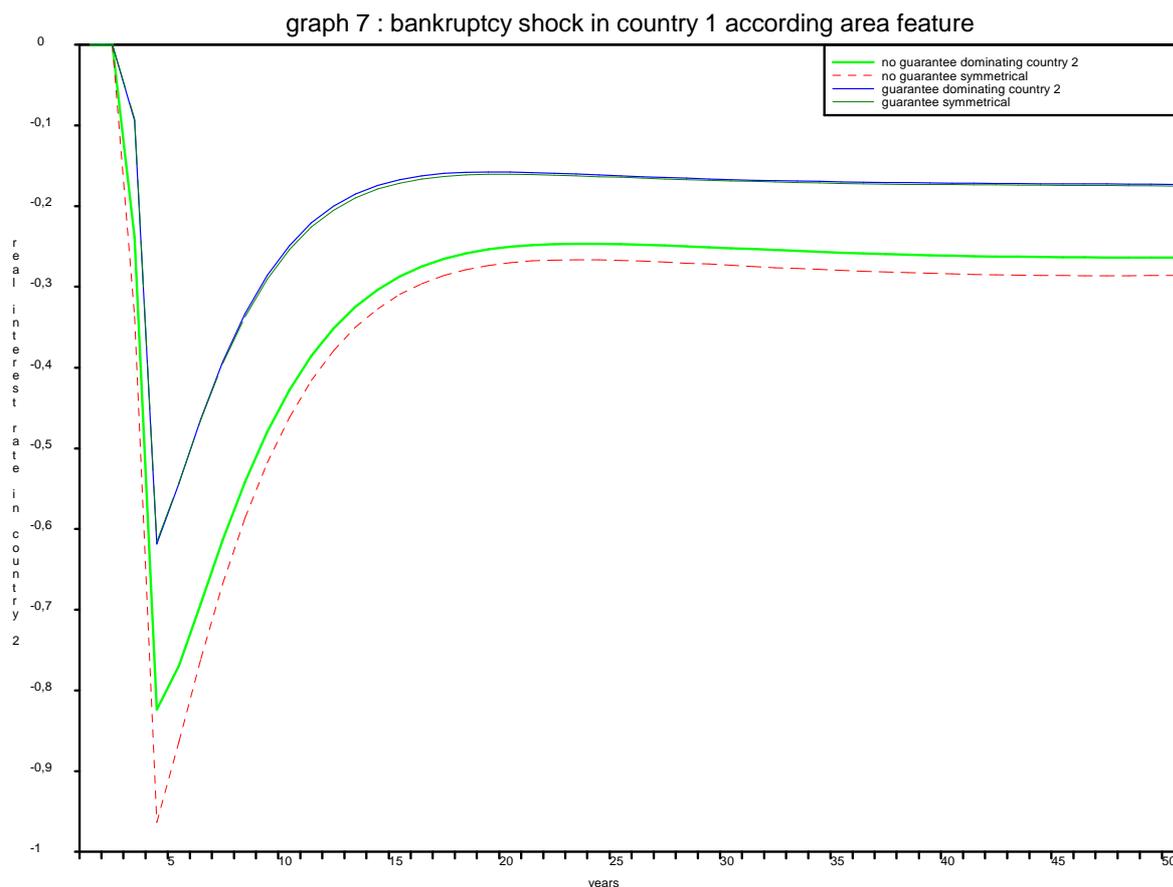
Thus, to summarise, the coordinated response occurs, when the central bank guarantees stabilisation public debts, while refinancing debt is treated as Ricardian and allocation debt as a private debt. In that case, the currency area becomes symmetrical in the long term and and it no more matters, after a financial shock, whether guaranties, government refinancing and Basle's ratios are contingent to countries or common. The portfolio behaviour that introduced an incompatibility triangle, is confined to debt outside stabilisation : refinancing are reduced in the long term by taxes and allocation debt by the yield of public capital.

But, if the guarantee fails, response to shocks matter matters more. With the same financuial shock of –10 in the first country, let us study results according to the distribution of risk premiums, of government guarantees and of taxes.

Graphs 8,9 and 10 describe the impacts of a risk premium of 5%, after a rating's change in period 3, after government of country 1 has refinanced $Z01=10$ in period 2 following the financial shock $T01=-10$ in period 1. The risk premium increases the interest rate in country 1, attracts financial wealth (that absorbs the additional public debt) and reduces demand. Productive capital stock and production capacity are hardly changed in the short run. The degree of utilisation capital buffers the shock. The increase of the interest rate in the country hit by the shock induces a production transfer towards the leading country. It benefits from the decrease in the interest rate following the depression.

Graph 8: impact on output of a 5% risk premium in country 1

graph 8 : effect on output of a risk premium of 5% on country 1 debt

Legend:
- output 1 without risk premium
- output 1 with risk premium
- output 2 without risk premium
- output 2 with risk premium

y-axis: output

x-axis: years
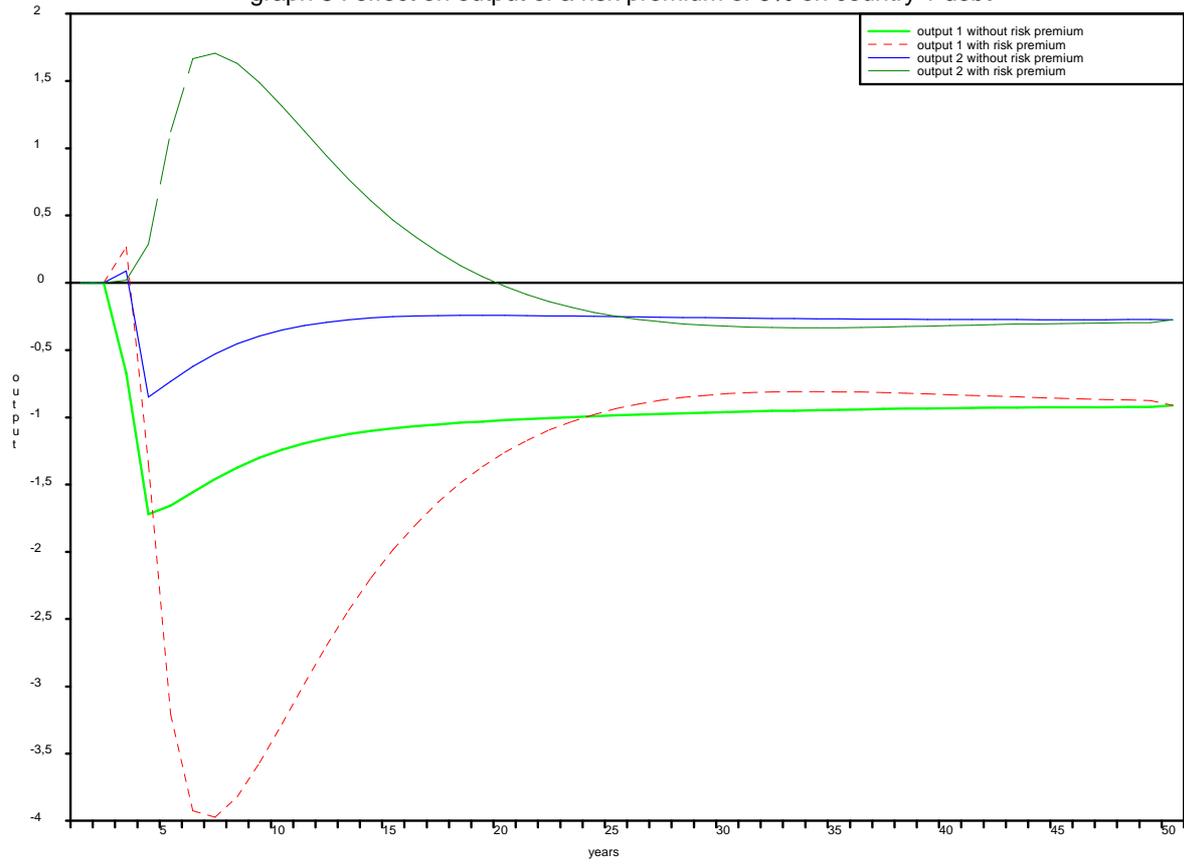
Graph 9: Inpact on real interest rate of a 5% risk premium in country 1

graph 9 : effect of a 5% risk premium on country 1 debt
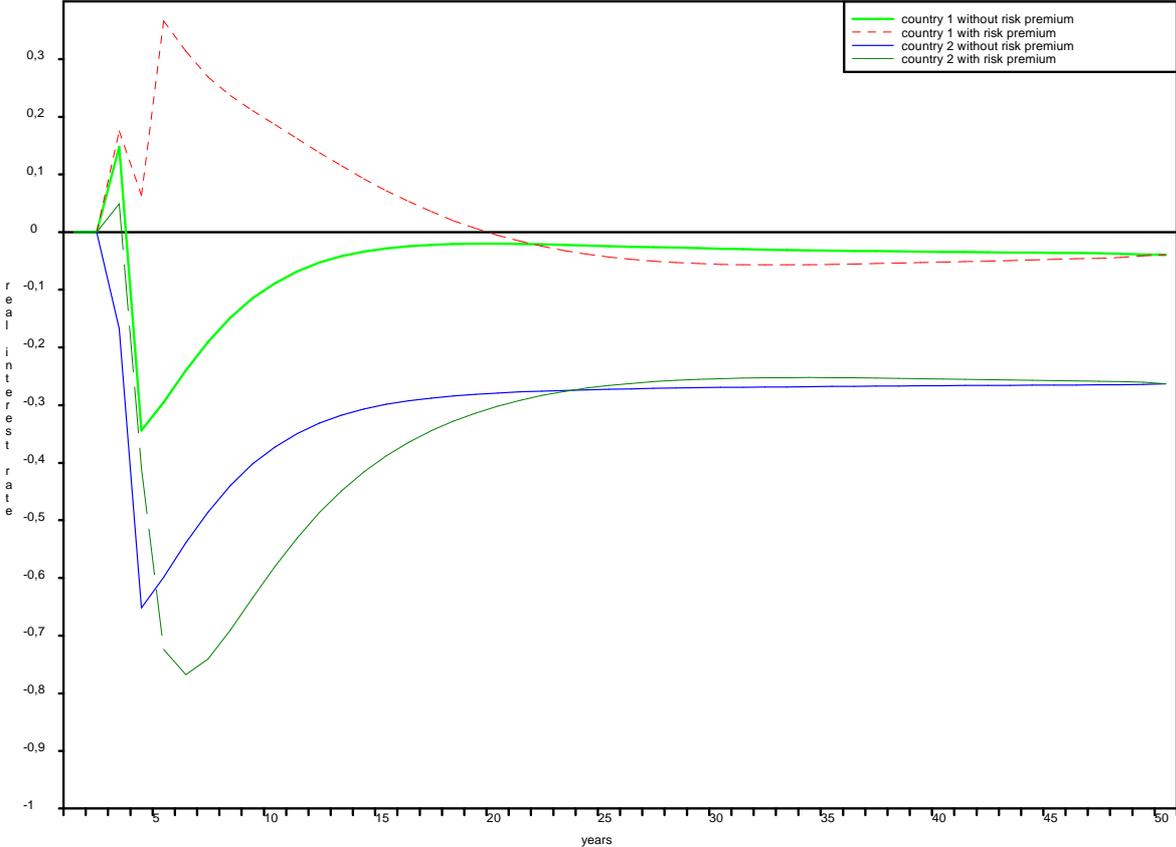
Graph 10: impact on the degree of capacity utilisation of risk premium in country 1

graph 10 : effect of a 5% risk premium on country 1 debt
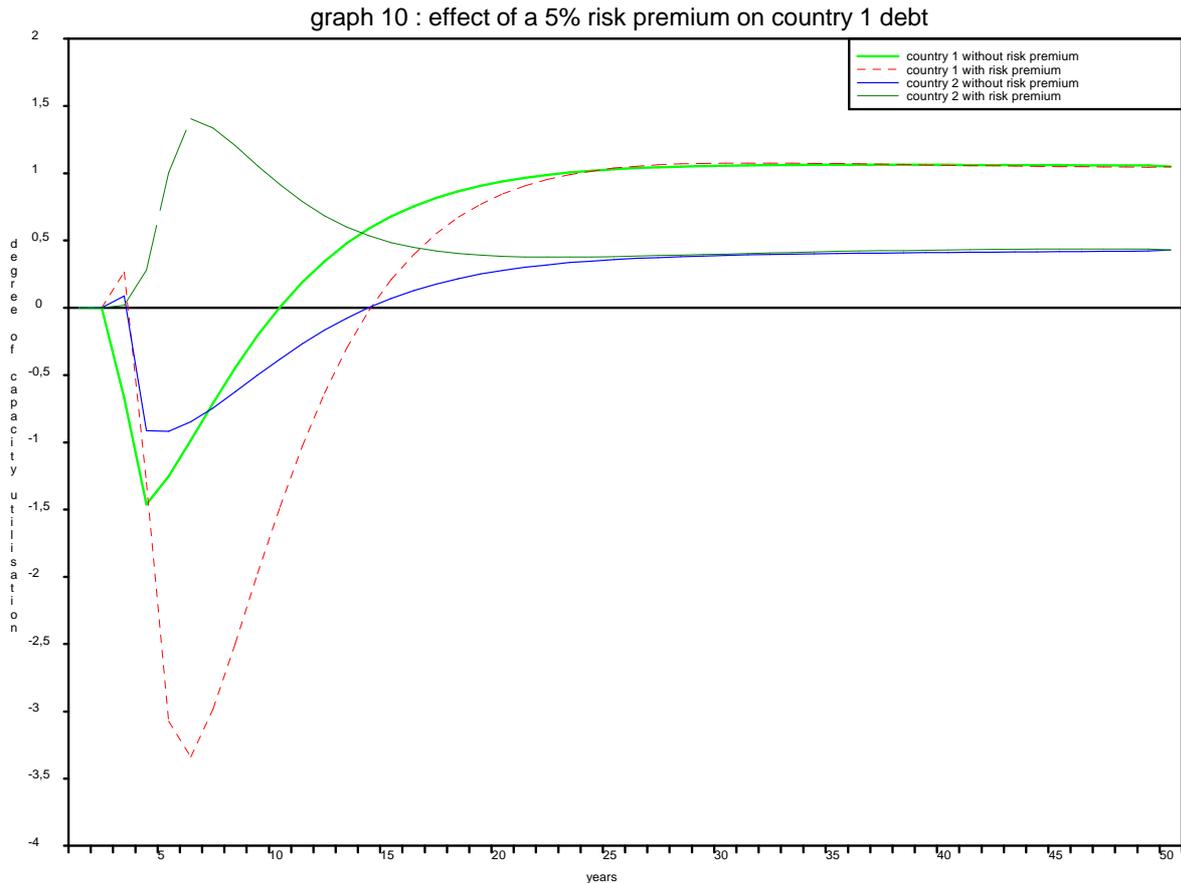
In the long term, the differential risk premium and the absolute risk premium, related to rating for example, are susbstitutes, since the overall risk premium is endogenous and equalises both rates of inflation. Simulation 14 describes the impact of a negative shock on the value of financial private capital (bankruptcy), when the government of country 1 guarantees assets. Recession is diffused through the union (decrease of production of –0.91 and –0.27 respectively) without modifying inflation (see appendix 3). It induces a decrease in the nominal and real interest rates. Two mechanisms are generically working as in all simulations of the model:

- firstly, financial losses reduce the price of capital and demand, then investment, then capacities, such that financial losses turn into real capacity losses.
- Secondly, the reduction of production capacities are compensated by the increase in the degree of capacity utilisation, which finally induces an increase in the yield of capital.

Country 1, being more hit by recession, achieves a trade surplus, an increase in the real exchange rate (a decrease in competitiveness) and bears a 0.25% risk premium. Recapitalisation of financial intermediaries of the country hit by the shock strengthen recession but is beneficial because the central bank decreases interest rate according to the feedback Taylor rule (compare simulation 12 with simulation 14). A expansionary budgetary policy as large as the amount of recapitalisation does not succeed in completly offsetting the shock, because the increase of public debt put a ceiling in budgetary policy (compare simulation 11 to simulation 12). Let us summarise : After a specific adverse financial shock, policy reaction in one country (guarantee, recapitalisation, budgetary policy), specially when it is dominated and bears alone the long term risk premium, bumps in the long term, against

the government stability condition and looses its efficiency. On the other hand, the country that is not hit by the shock (specially if it is dominating) benefits of the decrease in interest rate and of the expansionnary budgetary policy that appear always in recession stances. Only a coordinated expansionnary policy is efficient, because the country that had not been hit by financial adverse shocks, and which policy is thus more efficient, is involved.

An example of isolated countercyclical budgetary policy is given by simulation 142. A suboptimal policy that brings back output in the union at the preceding level is given by simulation 144 (appendix 4).

But this policy – which improves the situation of both countries - is insufficient. The optimal policy, that would bring back production of each countries to the preceding level, is impossible for two reasons: firstly, the increase of public expenditures of the dominating country, that is not hit by the shock, is limited by the fact that its production is nearly optimal; secondly, the expansionnary policy of the dominated and hit country is limited by inflation that increases its risk premium and its real interest rate. Thus, the possible optimum ($Y1=-0.123$ and $Y2=+0.042$) that corresponds to public expenditures $G01=10.15$ and $G02=0.556$ is not first best. The following table gives a scanning that shows the how expansionnary policy exhausts.

Table 4: optimal policy

G01	5.0	9.0	9.5	10.0	10.15	11.0	12.0	15.0
Perte	7.529	1.889	1.760	1.703	1.699	1.792	2.157	5.796
Y1	-0.274	-0.133	-0.127	-0.124	-0.123	-0.124	-0.135	-0.225
Y2	-0.005	0.034	0.037	0.041	0.042	0.049	0.058	0.087
F1	73.89	94.41	07.07	99.77	100.58	105.18	110.68	127.60
F2	52.53	52.18	52.13	52.08	52.06	51.97	51.06	51.48
G1	0.221	0.113	0.081	0.046	0.034	-0.037	-0.135	-0.519
G2	0.050	0.120	0.130	0.140	0.143	0.162	0.204	0.259

G02=0.556

When the central bank does not guarantee public debts, some shocks cannot be reduced completely: the required countercyclical policy that is needed hits the stability constraint. This counter-example is sufficient (bearing in mind that the size of the shock (10%) is of the same magnitude as unemployment) to assert that the non-guarantee of the central bank hinders policies aiming at full employment.

Is it possible to remove this obstacle by coordinating public guaranties, private reserves in the Basle's sense or by taxing risk premiums? We shall see that it is not the case either. For, in the long run, all is built on risk premium. Firstly, the sharing of refinancing in the area does not matter, when they are reduced to zero in the long term. Secondly, Basle's reserves are neglectible: by coordinating insurance against shocks, governments make recapitalisation requirements neutral. Lastly, taxes on risk premium remain : it does prevent relative risk premiums to appear. Indeed intermediaries bypass taxes,n when they claim higher risk premiums. To bring back production to the previous level, complete guaranty of the central bank is needed.

Simulations 131 and 132 in appendix 4 gives consequences of a finnacial shock, when public refinancing are symmetrically distributed among both countries. They must be compared with simulations 142 and 144. Simulations 137 and 138 add the symmetry of reserves and must be compared with the preceding ones. Simulation 150 gives the result, when governments levy an almost confiscatory rate of taxation on risk premiums, in order to guarantee indirectly

debts. Simulation 151 gives the optimal solution, obtained from coordination of budgetary policies, which minimizes the sum of squared production losses.

When public guarantees are coodinated, the interest rates are equalized (simulation 131 and 132 against 143 and 144) but results are similar, because risk premiums change little (1.39 and 0.23 in uncoordinated and coordinated situations respectively against 1.39 et 0.25). The coordination of Basle's ratios even deteriorates the overall situation (the risk premiums are 2.40 and 0.42), but it improves the situation of the dominated country and deteriorates tghe one of the dominating country, because it equalize interest rates. Above all, when risk premium are subject to tax and when the revenue of it is shared among both countries in a fair way, the situation of the country hit by the shock deteriorates and the situation of the other improves. This is the consequence of tax redistribution that reduces the apparent average rate of the dominating country. On the other hand, the dominated country still bears a risk premium.

Results are emphasized with dynamics (see graphs 11 and 12 below). When the dominated country bears alone the guaranty of the shock, its production decrease heavily in the short term, because of rising risk premium, interest rates and dinishing yield of capital. The production of the dominating country increases. With symmetrical refinancing, interest rates equalise and the dominated production improves to the detriment of the dominating one. The symmetrisation of reserves intensifies the result. On the contrary, tax on risk premium improves production of the dominating country, because he is given half of tax revenues back. This tax sharing more than offset the decrease of the differential risk premium.
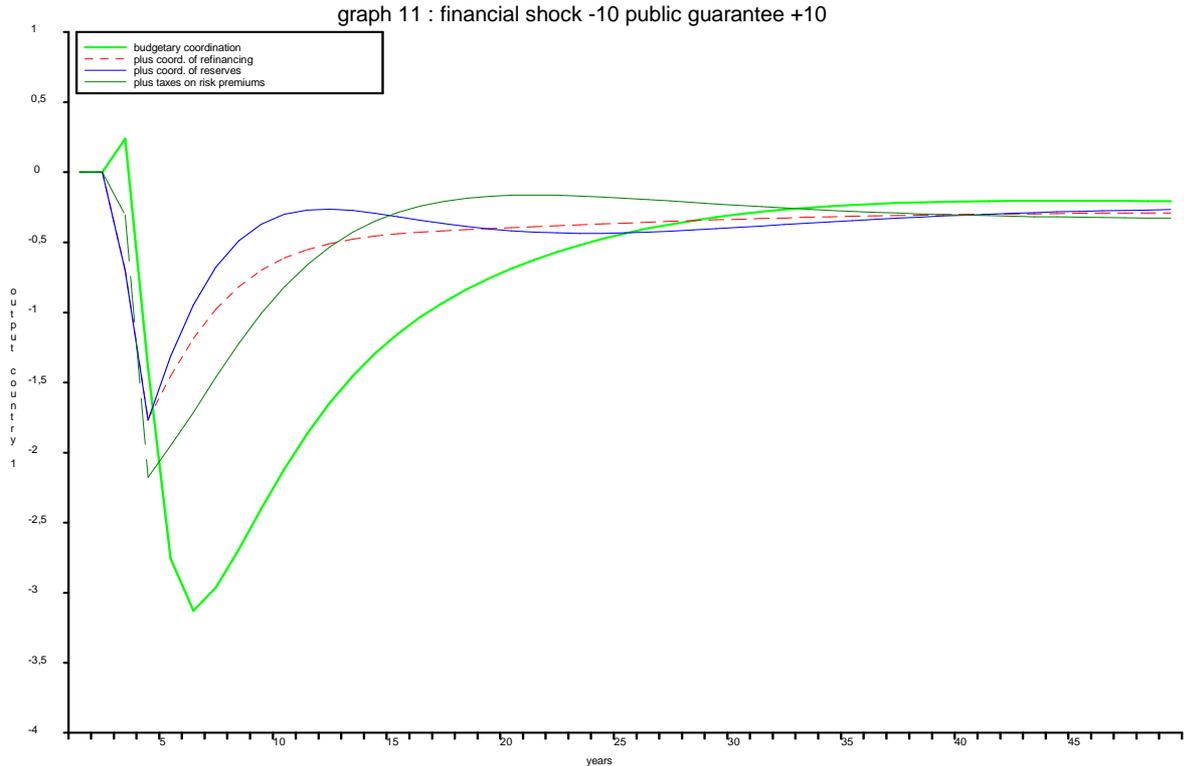
Graph 11: Output in the dominated country

Graph 12: output in the dominating country

graph 12 : financial shock -10 public guarantee +10
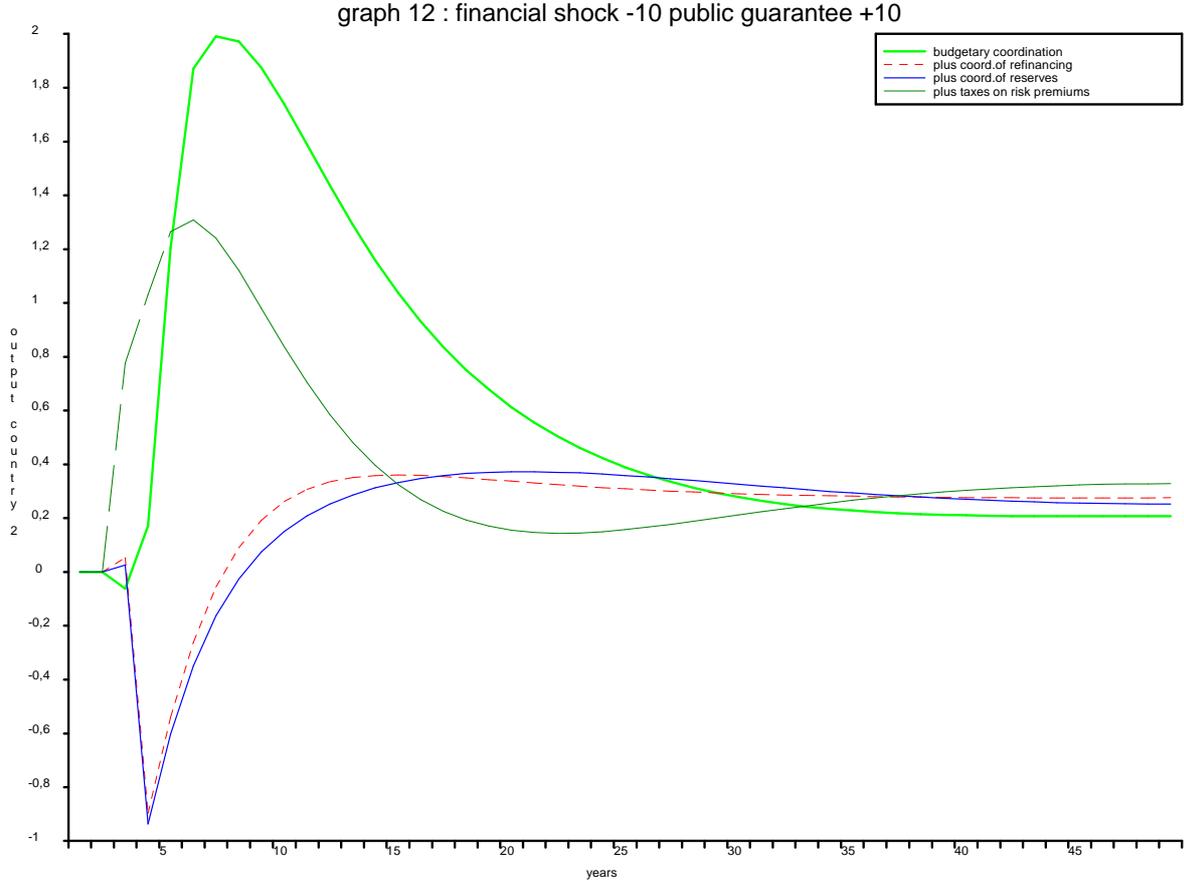
Conclusion

Is the central bank guarantee and refinancing by governments sufficient to reduce asymmetrical financial adverse shocks and recover full employment? Answer is no. As previously seen, guarantee and refinancing reduces negative effects of risk premiums and avoid procyclical budgetary policies in the short term in the country hit by the shock. But it is insufficient to reduce completely shocks and return to full employment. Indeed, the guarantee of the central bank, when it is mixed with our modified golden rule and a Ricardian treat of refinancing, symmetrises the currency area. In that case, spillovers are near one, and budgetary stabilisation policies alone cannot deal with asymmetrical shocks. Thus, as budgetary policies are limited by the stability constraint of debt, a complete optimal first best policy of great magnitude cannot be reached by a mix of expansionnary and restrictive policy. Besides, adverse financial shocks become negative capacity shocks. The productive capital of the country hit by the shock must be extended. When risk premiums are suppressed, some wealth is transferred to productive capital, as a reverse flight to quality effect. But this effect is similar in both countries, such that the return to full employment in one country implies overemployment in the other. If this effect is to be avoided, capacity must be increased in one country only through public investment or an increase in the yield of capital. These two channel are neutral on stability of debt because of the proposed golden rule.

General conclusion

The different economic and policy responses to the crisis of 2008 has lead to the public debt crisis. It is actually the consequence of economic divergences that come from different social and financial institutions. Herein, we proposed to separate debt according tn of its issue. The public expenditure are divided in four function : stabilisation, refinancing, welfare and allocation, in the Musgrave spirit. Ruling out the two last functions, the separation between stabilisation and refinancing has been here tackled. Refinancing is considered as Ricardian and stabilisation as Keynesian. Coordination concerns stabilisation only. But it is not sufficient to reduce shocks and to fulfill full employment. The guarantee of the stabilisation debt by yhe central bank of the union is necessary to suppress the relative country risk premium, in the absence of the other stabilisation ways in a currency area : labour mobility or specialisation through factor substitution.

Coordination features must be extended. They concern not only the fiscal or budgetary intruments but also guarantees of debt, by governments reaction functions to stabilise debt and by the central bank to guarantee a riskless interest rate. This argument is assessed by panel econometrics on the Euro area and with a transformed Keynesian model to allow for the second order of economic policy (macroeconomic insurance). The extended golden rule leave place to extensions to other fields (social security and growth) that are obviously beyond the scope of this paper.

Appendix 1: the model in a currency area

The currency area is composed of two identical countries with same size, same structure, same endowments, same behaviours. The latter ones include a wealth and a portfolio effect. The overall balance of payments is not balanced by flows but the net external position in stocks is. There are two real assets issued by each country: public debt and productive capital. The rest of the world is neglected. Intermediaries centralise savings and demand risk premiums, when they invest. The purpose of the model is to question the policy-mix in the currency area and the stability of public debts when there are real or systemic bankruptcy shocks.

The budgetary policy includes a deliberate exogenous public expenditures policy and a stabilisation rule of the debt through expenditures or taxes in the meaning of Leeper. The fiscal policy is defined by flat tax rates and includes an income tax including interests on debt, a tax on wealth (public debt and capital) and a tax on risk premium demanded by financial markets on the debt of countries. Income and/or private wealth taxes are levied according to the residential criterion and taxes on public debt and/or its interest earnings at the origin. The Central Bank of the area pegs the interest rate according to a Taylor rule including a deliberate interest rate and a reaction to stabilize average production and inflation. At the second order, the Central Bank guarantees none, part or the whole public debt by refinancing it at the risk free interest rate it sets (feedback guarantee of the liabilities of financial intermediaries), at least in the short run. The rest of the public debt is risky and yields the rate including the risk premium desired by the private sector. Private agents' portfolio depends upon relative yields excluding risk premium because of risk aversion but the risk premiums are paid for. Macroeconomic guaranty against bankruptcy is obtained through reserves computed with a Basle prudential ratio. If reserves are monetary, they are priced with goods' price, if they are capital, they are priced with the price of productive capital. In both cases, they are not produced but earn the interest rate (if they are monetary) or the rate of profits (if

they are capital). These incomes are part of overall value added. The cost of reserves is the sum of the yield of old ones and the accumulation of new ones. They differ from scrapping because they are not produced. They dilute the rate of profits as the cost of intermediation. In the long run, the Tobin'q of firms is equal to one and the Financial Tobin's q greater proportionally to reserves: $qf = q(1 + K_I / K)$.

Wealth accumulation is a consequence of the behaviour of households under the income constraint. Public expenditures correspond to a propensity to consume equal to 1, propensity to consume income and taxes is equal to average and propensity to consume risk premium is zero.

Market dynamics determine the change of real assets prices and relative price of public debt. The value of financial capital is given by the equilibrium of the capital market. Public debts earn interest augmented by the differential risk premium. Public debt is renewed at each period in order to be consistent with the central bank.

Intermediaries require a risk premium on private capital or public debt. There exist four risk premiums, which are not independent: two private ones related to production and to public ones. Spontaneously the economy is unstable. Specific shocks or autonomous budgetary and fiscal policies lead to equilibrium, where one country becomes richer and richer because inflation rates differ. Stability is obtained when the difference in risk premia equalises inflation rates. The value of this discrepancy depends on the portfolio choice and the income distribution.

The latter one is not neutral on the stability of equilibrium in the long term. In a conflict model of income distribution such as the WS-PS model, the equalisation of inflation rates is sufficient to obtain a stationary long term neoclassical model.

In a Phillips model (without inflationary illusion) – when the growth of real wages depends on the unemployment rate – full employment (or classical unemployment) can only be obtained, when some constraints are added. The spontaneous equilibrium is generally speaking unstable, when factors are complementary. Its stability depends upon the excess of the propensity to consume out of wages over the one out of profits, and upon adjustment lags. With equal propensities and prices adjusting faster that wages, stable Goodwin cycles appear. With factors substitution (here Cobb-Douglas), stability is obtained as in the WS-PS model because substitution introduces the level or real wages.

So to obtain full employment, some substitution between capital and labor is needed. The increase of the relative real cost of capital to labour favours employment without introducing destabilising effects on income distribution. The change in techniques (HOS sense) is an alternative to labour mobility in a currency area.

Equations in country 1.

(1) $Y_1 = G_1 + C_1 + I_1 + B_1 + d_1 * K_1(-1)$

(2) $B_1 = n(Y_1 - Y_2) + n(\delta(j_0 x + j_1 x(-1) + j_2 x(-2)) - x) + B_0$

(3) $C_1 = (1 - \varepsilon)C_1(-1) + \varepsilon \left[c(Y_1 + c_0 w_{R,1}) - \sigma r_1 + h(W_1 - K_{I,1}^G - W_0) \right]$
$\quad - \varepsilon * c * t_{31} * (W_1 - W_0)$

(4) $I_1 = v(q_1 - 1)K_1$

(5) $K_1 = K_1(-1) + I_1(-1)$

(6a) $KI_1 - KI_1(-1) = l_1(KI_1^d - KI_1(-1) - KI_{10})$ avec $KI_1^d = lq_1 K_1$

(6b) $KI_1 - KI_1(-1) = 0,5l_1(KI_1^d + KI_2^d - KI_1(-1) - KI_2(-1) - KI_{10} - KI_{20})$

(6c) $KI_1^d = l(q_1 K_1 + K_{I,1}^G)$ ou $KI_1^d = l(q_1 K_1 + F_1)$

(7) $U_1 = kY / K_1$

(8) $G_1 = G_1^0 - f(F_1 - F_0)$

(9) $\begin{aligned} T_1 &= t_{11}(Y_1 + (i_1 - \pi_1)F_1) \\ &+ t_{31}(W - W_1^d) + (1 - l_g)t_{21}(1 - t_{11})\delta_x F_1(-1) \end{aligned}$

(10) $\begin{aligned} F_1 &= (1 + r_1^m(-1))F_1(-1) + G_1(-1) \\ &- t_{11}Y_1(-1) - t_{31}(W_1(-1) - W_1^d) + Z_{0,1} \end{aligned}$

(11) $K_{I,1}^G = (1 + r_1 - f)K_{I,1}^G(-1) + Z_{0,1}$

(12) $i_E = i_1^0 + \alpha(Y_1 + Y_2)/2 + (1 + \beta)(\pi_1 + \pi_2)/2$

(13a) $i_1 = i_E + \delta_x$ et $i_2 = i_E$

(13b) $i_1 = i_E + \delta_x/2$ et $i_2 = i_E - \delta_x/2$

(14) $r_1 = (i_1 - \pi_1 - t_{21}\delta_x + (1 - t_{21})\delta_{G1})(1 - t_{11})$ et $r_2 = (i_2 - \pi_2 - t_{22}\delta_x + (1 - t_{22})\delta_{G2})(1 - t_{12})$

(15) $r_1^m = l_g(i_1 - \pi_1) + (1 - l_g)r_1$ et $r_2^m = l_g(i_2 - \pi_2) + (1 - l_g)r_2$

(16) $\pi_1 = \dfrac{\lambda}{1 - \lambda}(\dfrac{nx + \gamma w_{R,1} + (1 - \gamma)(i_E - \pi_1 + d_1 + \delta_1)}{1 + n} + \varphi_P(U_1 - 1) - p_1^0)$

(17a) $w_{R,1} = (1 - \mu)w_{R,1}(-1) - (1 - \mu)\pi_1 + \mu\varphi_W Y_1 + w_1^0$

(17b) $w_{R,1} - w_{R,1} = (1 - \mu)(w_{R,1}(-1) - w_{R,1}(-2)) + \mu\varphi_W(Y_1 + (1 - \gamma)(i_E - \pi_1 - w_{R,1})) + w_1^0$

(17c) $w_{R,1} - w_{R,1} = (1 - \mu)(w_{R,1}(-1) - w_{R,1}(-2)) - (1 - \mu)(\pi_1 - \pi_1(-1)) + \mu\varphi_W Y_1 + w_1^0)$

(18) $x = p_2 - p_1$ avec $p_1 = p_1(-1) + \pi_1$ et $Dx = x - x(-1)$

(19) $\delta_x(+1) - \delta_x = x - x(-1) + \pi_1 - \pi_2$

(20) $Dq_1 = q_1(+1)/q_1 - 1$

(21) $PRO_1 = (1 - t_{11})(1 - \gamma - \gamma w_{R,1})Y_1 - nx - d_1 K_1(-1) - (KI_1 - KI_1(-1))$

(22) $TP_1 = \dfrac{PRO1}{q_1 K_1 + KI_1} - \delta_1 + Dq_1$

(23) $\begin{aligned} W_1 &= (1 + r_1^m(-1))F_{11}(-1) + (1 + r_2^m(-1) + Dx(-1))(F_2(-1) - F_{22}(-1)) \\ &+ A_{11}(-1)(1 + Dq_1(-1)) - PRO_1(-1)(A_1(-1) - A_{11}(-1))/A_1(-1) \\ &+ A_{21}(-1) * (1 + Dq_2(-1)) + Dx(-1)) + PRO_2(-1)(1 + Dx(-1))(A_2(-1) - A_{22}(-1))/A_2(-1) \\ &+ Y_1(-1)(1 - t_{11}) - C_1(-1) - nx(-1) \\ &- d_1 * K_1(-1) - (KI_1 - KI_1(-1)) + Z_{0,1} \end{aligned}$

(24) $F_{11}/W_1 = f_{11} + h_{12}(r_1^m - r_2^m - Dx) + h_{13}(r_1^m - TP_1 - \delta_1) + h_{14}(r_1^m - TP_2 - \delta_2 - Dx)$

(25) $F_{21} = W_1 - A_{11} - A_{21} - F_{22}$

(26) $A_{11}/W_1 = a_{11} + h_{23}(TP_1 + \delta_1 - r_2^m - Dx) - h_{13}(r_1^m - TP_1 - \delta_1) + h_{34}(TP_1 - TP_2 + \delta_1 - \delta_2 - Dx) - T_{01}$

(27) $A_{21}/W_1 = a_{21} - h_{14}(r_1^m - TP_2 - \delta_2 - Dx) - h_{24}(r_2^m - TP_2 - \delta_2) - h_{34}(TP_1 - TP_2 + \delta_1 - \delta_2 - Dx) - T_{02}$

(28) $A_1 = A_{11} + A_{12}(1 + x)$ et $A_2 = A_{22} + A_{21}/(1 + x)$

(29) $q_1 = \dfrac{A_1}{K_1}$

(30) $F_1 - (1 + x)F_2 = F_{11} - F_{21} - (1 + x)(F_{22} - F_{12})$

(31) $F_1 + (1 + x)F_2 = F_{11} + F_{21} + (1 + x)(F_{22} + F_{12})$

The regimes of the model

a) Price-wage loop

The WS-PS model corresponds to equation (17a), the Phillips model with capital/labour substitution to equation (17b), the Goodwin-Phillips model with total indexation to equation (17c).

b) Assets guarantee by government

Debt $K_{I,1}^G$ corresponds to refinancing by government whatever the underlying asset. It is ricardian stabilised with a 0 target in the long term (equation (11)). It is hold by households according to portfolio behaviour. This policy can be uncooperative between the two countries: $Z_{0,1} > 0$ et $Z_{0,2} = 0$. It can be symmetrical or cooperative: $Z_{0,1} > 0$ et $Z_{0,2} > 0$, according to proportions that can be optimised.

c) The guarantee by the central bank

It is described by equation (15), which weights interest rates.

If $l_g = 0$, there is no guarantee

If $l_g = 1$, guarantee is complete. The relative risk premium δ_x is not determine at first sight. It is determined (1) because there is perfect substitution of public debt (2) because the share of refinancing is not 0 in the short term and tends slowly to 0 in the long term.

d) Nature of the area

It is given by equations (13) which computes the risk-free interest rate.

- "dominance" of country (2): its risk-free interest rate is the one of the central bank (equation (13a)).
- "symmetry ": the average risk-free rate of the area is the one of the central bank (equation (13b)).

Risk premiums set by markets are $\delta_{G,1}$ and $\delta_{G,2}$. Their difference $\delta_{G,1} - \delta_{G,2}$ is a substitute for δ_x. On the other hand, it appears a premium towards the rest of the world: $\delta_{G,1} + \delta_{G,2}$.

e) Basle reserves

The mean adjustment lag of unproduced financial reserves is 5 years ($l = 0.08$, $l_1 = 0.2$). They are defined on equity risky assets (equation (6a)). When intermediaries are unified in the currency area, ratios are computed on the overall risky capital of the area (equation (6b)). If the central bank do not guarantee debt, they are also defined according to public debt and depends on the (a-)symmetrical characteristics of the area (equation (6c)). Reserves are computed on a stock smaller than overall risky assets.

Significance of variables

Y, C, I, G et B are production, consumption, investment, public expenditures and trade balance; $x = p_2 - p_1$ is the logarithm of the difference between prices of country 2 (p_2) and of country 1 (p_1), w_R is the logarithm of real wage, K the productive capital, d the rate of scrapping, PRO et TP are gross real profits and expectation of the rate of real disposal financial profits according to financial assets, diminished by scrapping, reserves and premium, q is relative price of capital, π, Dx et Dq are inflation, change of competitiveness and change of anticipated price of capital, U the degree of utilisation capacities, W_i is country $[i]$ real wealth. It is the sum of F_{11}, the real public debt of country 1 relative to prices of country 1 held by agents of country 1, F_{21} is real public debt of country 2 relative to prices of country 1 held by agents of country 1, A_{11} is real financial capital of country 1 relative to prices of country 1 held by agents of country 1 and A_{21} real financial capital of country 2 relative to prices of country 1 held by agents of country 1. Flat tax rates on income are

t_{11} and t_{12}, on property are t_{31} and t_{32}, on risk premiums t_{21} and t_{22}. The nominal interest rate i_E is set by the central bank, the nominal and real interest rates on public debt, including premiums, are i_1, i_2 r_1 et r_2, the average rates including guarantees are r_1^m and r_2^m, the risk premiums are $\delta_{G,1}, \delta_{G,2}, \delta_1, \delta_2$. The Basle prudential ratio is $l = 0.08$, the share of the guaranteed assets is l_g (for instance, $l_g = 0$ and $l_g = 0.5$). Private reserves are written down KI and public refinancing K_I^G. B_0, w_i^0 et p_i^0 are trade balance shocks, wages and prices shocks. All parameters are positive and have the following values: share of external trade $n = 0.20$, external trade elasticities $\delta = 3$, J curve: $j = (0.3, 0.4, 0.3)$, capital coefficient $k = 2.0$, profitability effect in the investment function $v = 0.2$, rate of depreciation $d = 0.05$, initial share of salaries $\gamma = 0.7$, propensity to consume out of income $c = 0.675$ (consistent with initial steady state growth), propensity to consume out of wealth $h = 0.05$, real interest rate semi-elasticity of demand $\sigma = 1.0$, budgetary and monetary reaction functions $f = 0.2$, $\alpha = \beta = 0.5$, tax system rate $t_{11} = 0.1$, $t_{31} = 0.04$, degree of utilisation capacity elasticity of prices and production (employment) elasticity of wages: $\varphi_P = 0.3$ et $\varphi_w = 0.3$, adjustment lags of prices, wages and consumption: $\lambda = 0.2$, $\mu = 0.2$, $\varepsilon = 0.5$.

The model is simulated as a deviation from a baseline where production is $Y_0 = 100$, consumption $C_0 = 80$, investment $I_0 = 20$, public expenditures $G_0 = 0$ (balanced budget) and trade balances $B_0 = 0$, each public debt $F_0 = 50$ and productive capital $K_0 = 200$ (capital coefficient $k = 2$). The value of wealth is $W_0 = 200 + 50 = 250$. Agents initially hold 75% of wealth in national assets: $F_{11} = 37.5$, $F_{21} = 12.5$, $A_{11} = 150$ and $A_{21} = 50$. Portfolio parameters are: $f_{ii} = 0.15$, $f_{ij} = 0.05$, $a_{ii} = 0.6$ and $a_{ij} = 0.2$ with $f_{ii} + f_{ji} + a_{ii} + a_{ji} = 1$. Except when there is full guarantee, it is assumed $h_{ij} = 1 \, \forall (i, j)$. Initial interest rate, rate of depreciation and premium are $r_0 = d_0 = \delta_0 = 0.05$, gross profit rate $\dfrac{1-\gamma}{k} = 0,15$, net profit rate $0.15 - 0.05 - 0.05 = 0.05$. In the base line, the degree of capacity utilisation and prices are equal to 1: $\pi_0 = x_0 = w_{R,0} = 0$ et $U_0 = q_0 = 1$.

Financial shocks

Private bankrupcy shocks $-T_{0,1}$ are financed by a reduction of capital wealth A_1, by a reduction of private reserves $-KI_{10}$ or by an increase of public debt $+Z_{0,1}$. Systemic shocks are simulated through a decrease of financial assets $KI_{10} < 0$.

Quick commentary about equations

With equation (1) the gross production is set by demand. Equation (2) is trade balance with a J curve. Equation (3) is consumption. Total disposable income is partly consumed as well as the increase of the purchasing power of salaries (propensity to consume equals $c_0 c$). Profits are accumulated as wealth. Then wealth is consumed with h_0 propensity. Productive capital has the same effect as public debt. According to equation (4), the net investment of firms depends upon profitability (the discrepancy between the rate of profits and the interest rate) measured by Tobin's q. Equation (5) defines the accumulation of productive capital, equation (6) the Basle's prudential reserves, equation (7) the degree of utilisation of capacities. Equation (8) is the reaction function of the State: public expenditures depend upon the target of expenditures and the aim to stabilize debt. Equation (9) is the sum of taxes. Equation (10) is the dynamics of public debt. Equation (11) is the dynamic of refinancing. Equation (12) is

the reaction function of the central bank, which set the interest rate to stabilize production and inflation of the area. Equation (13) defines the interest rates including risk premia on public debts. Equation (14) defines the net interest rates excluding taxes on income and premiums. Equation (15) is the apparent real interest rate weighted by public debts considering the share guaranteed by the central bank. Equations (16), (17a), (17b) et (17c) are the price-wage loop: WS-PS model or rate of growth model (Phillips model or labor/capital substitution model according to a Cobb-Douglas or total indexation). In the first case, unemployment influences the level of wages, in the second one, the rate of growth of wages. There is no nominal illusion from salary earners, but in some cases inflationnary illusion because of lags. As far as price formation is concerned, imports are used as intermediate consumption. Firms have a value added of 1, intermediate consumption is n, production is valued $1+n$, sell for 1 on the internal market, n is exported. According to equations (18), (19) and (20), expectations of premiums and prices of capital are rationnal. The accounting equality (21) gives the level of real profits from distribution. Equation (22) is the expected real financial yield including the appreciation of asset prices, less depreciation, less risk premium and less new reserves.

Reserves yield the same profit eventhough they are not productive. Equation (23) is the accounting increase of real wealth by households: a part of profits is exported, a part is imported. Equations (24) to (27) describe the portfolio choice as function of expected yields. Equation (28) is the accounting demand of financial capital. Equation (29) is the financial equilibrium, which determines the price of capital. Equation (30) is the external public position: it replaces the balance of payments in the usual models. By Walras law, equilibrium of the overall public debt is automatically verified.

Stability conditions are given by eigenvalues. Three variables are rationnally expected, the two prices of capital and the relative risk premium on public debt. The modules are given in the following table.

Model	L1	L2	L3	L4	L5
WS-PS	1.95	1.48	1.32	0.94	0.90
Phillips	1.95	1.55	1.34	0.95+0.18i	0.95-0.18i
Goodwin	1.96	1.47	1.32	0.99+0.09i	0.99-0.09i
Garantie BC	1.48	1.34	1.00	0.95	0.90

Appendix 2: long term effects in a flexible exchange rate regime

Simulation 3 : Public expenditures shock of 10 in country 1
Simulation 11 : Financial loss in capital of 10 in period 1, then public guarantee of 10 in period 2, finally expansion of public expenditrures of 0.08 to stabilise production.

	WS-PS model		Phillips model (1)	
Variables	3	11	3	11
Y1	3,90	0	0	0
Y2	0,19	-0,98	0	0
C1	1,75	-2,33	8,90	-3,80
C2	0,76	1,77	0,57	-3,49
G1	0,63	-1,52	-4,81	-0,48
G2	0,28	1,31	-0,59	3,86
BAL	1,04	4,30	-0,50	3,35
INV1	0,48	-0,46	0	0
INV2	0,19	0,24	0	0
F1	96,83	58,01	124,04	52,38
F2	48,60	43,45	52,93	30,69
K1	209,68	190,88	128,12	218,55
K2	203,71	204,79	190,28	259,58
I1	2,35	0,80	13,23	-2,61
I2	-0,19	-1,25	1,30	-7,18
R1	1,88	0,24	3,97	-0,78
R2	0	-0,67	0,39	-2,15
INFL1	0,27	0,53	8,82	-1,74
INFL2	-0,19	-0,51	0,87	-4,79
TP1	-0,88	0,48	-3,39	0,30
TP2	-0,15	-0,03	-0,03	0,33
TU1	-0,89	4,78	56,11	-8,49
TU2	-1,64	-3,29	5,11	-22,95
WR1	0,11	-2,13	30,11	-9,59
WR2	0,81	1,74	2,78	-17,59
X	4,45	11,23	-1,25	8,38

(1) The Phillips model without inflationnary illusion converges only when the propensity to consume the increase of the purchasing power of wages is lower tha a critical value equal to 0.7.

Appendix 3: long term effects in a currency area (WS-PS model)

Simulation list

From (3) to (7) Deliberate (exogenous) public expenditures in country 1: $G_{0,1} = 10$.

(3) with taxes on income and wealth

(4) idem with public risk premium $\delta_G = 5\%$

(5) idem with private risk premium $\delta = 5\%$

(6) idem wuith both risk premiums $\delta = \delta_G = 5\%$

(7) idem with compensation by a counter-cyclical monetary policy $i_0 = -5\%$

Financial shocks

(8) Bankruptcy shock without guarantee in country 1: $T_{0,1} = -10$

(11) Bankruptcy shock with public guarantee and recapitalization of intermediaries of country 1 in period 2, then expansionnist budgetary policy in period 3: $T_{0,1} = -Z_{0,1} = KI_{0,1} = -G_{0,1} = -10$

(12) idem with a risk premium on public debt and without fiscal policy : $\delta_{G,1} = 5.0\%$.

(14) Bankruptcy shock with simple public guarantee : $T_{0,1} = -Z_{0,1} = -10$

(142) idem with a espansionary fiscal policy: $T_{0,1} = -10$, $Z_{0,1} = +10$, $G_{0,1} = 10$

(144) idem with coordinated expansionary fiscal policies to stabilize the GDP of the area: $G_{0,1} = 2.55$ et $G_{0,2} = 1.08$

(131) idem with public guarantees and expansionary fiscal policy in country 1: $Z_{0,1} = Z_{0,2} = 0$, $G_{0,1} = 10,0$, $G_{0,2} = 0,0$

(132) idem with common public guaranties and coordinated stabilisation budgetary policies: $G_{0,1} = 1.25$ et $G_{0,2} = 1.25$

(137) idem with common Basle reserves requirements and stabilisation in country 1 (second order optimal): $G_{0,1} = 10.5$

(138) idem with common Basle reserves requirements and coordinated optimal stabilization budgetary policies: $G_{0,1} = 2.00$ et $G_{0,2} = 1.17$

(150) Bankruptcy shock with common public guarantee, shared Basle ratios, without guarantee of the central bank, but with taxes on risk premiums to stabilize overall production of the area at the preceding level $fisc21 = 1.12$ and $fisc22 = 1.20$.

(151) idem without taxes but optimal budgetary policy in the Nash-bargaining sense : $G_{0,1} = 10,15$ and $G_{0,2} = 0,556$.

Variables	3	4	5	6	7
Y1	0,52	0,52	-0,37	-0,37	7,94
Y2	0 ,07	0,07	0 ,65	0,65	8,67
C1	-0,31	-0,31	-1,12	-1,12	5,29
C2	0,26	0,26	0,60	0,60	6,76
G1	0,03	0,03	0,04	0,04	1,72
G2	0,16	0,16	0,22	0,22	1,44
BAL	0,46	0,46	0,29	0,29	0,08
INV1	0,48	-0,46	0	0,42	0,85
INV2	0,19	0,24	0	0,12	0,55

F1	99,86	99,86	99,81	99,81	91,39
F2	49,21	49,21	48,91	48,91	42,81
K1	206,93	206,93	208,41	208,41	217,13
K2	202,23	202,23	202,52	202,52	211,05
I1	2,29	-2,72	2,33	-2,67	-3,13
I2	0,03	0,03	0,05	0 ,05	-0,31
R1	2,13	2,13	2,11	2,11	1,36
R2	0,10	0,10	0,06	0,06	-0,60
INFL1	-0,08	-0,08	-0,01	-0,01	0,36
INFL2	-0,08	-0,08	-0,01	-0,01	0,36
TP1	-0,88	-0,88	-5,36	-5,36	-5,35
TP2	-0,18	-0,18	-0,22	-0,22	-0,30
TU1	-2,84	-2,84	-4,39	-4,39	-0,57
TU2	-1,03	-1,03	-0,60	-0,60	2,98
WR1	0,47	0,47	-0,06	-0,06	0,95
WR2	0,34	0,34	0,25	0,25	1,17
X	1,39	1,39	0,20	0 ,20	0,13
DELTG	2,25	2,25	2,27	2,72	2,23

Variables	8	11	12	14	142
Y1	-5,42	-1,09	-1,75	-0,91	-0,35
Y2	2,37	0	-0,07	-0,27	-0,19
C1	-5,48	-1,50	-1,28	-0,69	-0,97
C2	3,38	0,36	0,12	-0,08	0,19
G1	-2,25	0	-0,11	-0,06	-0,02
G2	1,67	0,04	-0,10	-0,09	0,07
BAL	2,92	0,46	0,03	0,04	0,49
INV1	-0,61	-0,05	-0,39	-0,20	0,15
INV2	0,24	0,06	-0,05	-0,06	0,05
F1	61,25	100,04	50,54	50,31	100,09
F2	41,64	49,80	50,52	50,43	49,66
K1	187,81	199,16	192,11	196,12	203,04
K2	204,84	201,26	198,94	198,60	200,94
I1	0,56	2,14	-5,16	-0,04	-2,09
I2	-0,85	-0,36	-0,42	-0,29	-0,24
R1	0,55	1,98	-0,17	-0,04	2,09
R2	-0,71	-0,27	-0,440	-0,26	-0,15
INFL1	-0,06	-0,06	0,02	0,01	-0,07
INFL2	-0,06	-0,06	0,02	0,01	-0,07
TP1	0,63	-0,80	0,12	0,42	-0,53
TP2	-0,12	-0,15	0,06	0,19	-0,08
TU1	0,72	-0,67	2,28	1,05	-1,84
TU2	-0,04	-0,63	0,46	0,43	-0,65
WR1	-1,40	-0,10	-0,61	-0,30	0,19
WR2	0,94	0,23	-0,11	0,11	0,24
X	3,40	0,61	-0,76	-0,22	1,15
DELTG	1,40	2,50	0,25	0,25	2,43

Variables	144	131	132	137	138
Y1	-0,22	-0,50	-0,28	-0,35	-0,24
Y2	0,22	-0,23	+0,28	-0,18	0,24
C1	-0,41	-0,83	-0,33	-0,99	-0,37
C2	0,17	0	0,19	0,21	0,18
G1	0,21	0,16	0,15	-0,06	0,19
G2	0,09	-0,02	0,09	0,08	0,09
BAL	0,05	0,19	0,01	0,53	0,03
INV1	-0,07	-0,02	-0,11	-0,17	-0,03
INV2	0,01	0,02	0,01	-0,06	0
F1	61,69	74,17	55,50	102,79	59,03
F2	55,07	50,11	55,80	49,60	55,40
K1	198,57	199,50	197,81	203,40	198,25
K2	200,19	154,85	200,12	201,09	200,16
I1	0,51	1,17	0,27	2,35	0,45
I2	0,02	-0,22	0,04	-0,25	0,03
R1	0,51	1,08	0,22	2,19	0,39
R2	0,01	-0,18	0,01	-0,15	0,01
INFL1	0,02	-0,02	0,03	-0,08	0,02
INFL2	0,02	-0,02	0,03	-0,08	0,02
TP1	0,17	-0,03	0,28	-0,59	0,22
TP2	0,03	0,03	0	-0,10	0
TU1	0,50	-0,25	0,82	-2,01	0,64
TU2	0,12	-0,03	0,21	-0,72	0,16
WR1	-0,13	-0,05	-0,18	0,21	-0,15
WR2	0,01	0,03	-0,02	0,26	0
X	-0,11	0,34	-0,26	1,24	-0,17
DELTG	1,56	2,49	0,23	2,60	0,42
X	-0,11	0,34	-0,26	1,24	-0,17

Variables	150	151
Y1	-0,33	-0,123
Y2	0,33	0,042
C1	-0,25	-0,804
C2	0,38	0,298
G1	0,04	0,034
G2	0,02	0,143
BAL	0,05	0,473
INV1	-0,17	0,174
INV2	-0,04	0,072
F1	49,82	100,58
F2	49,89	52,06
K1	196,88	203,46
K2	199,41	201,48
I1	0,24	-2,728
I2	0,07	-0,114
R1	-0,11	2,101

R2	-0,33	-0,046
INFL1	0,05	-0,063
INFL2	0,05	-0,063
TP1	0,40	-0,55
TP2	0,11	-0,12
TU1	1,25	-1,82
TU2	0,63	-0,69
WR1	-0,28	0,214
WR2	0,08	0,264
X	-0,22	1,101
DELTG	0,173	-2,614

Appendix 4: Propensity to consume in the Euro area (Luxembourg excepted)

Econometric panel estimates are computed with TSP using the EUROSTAT data. The within, fixed effects and random models have been tested with Fisher and Hausman tests. The fixed effect model differentiating intercepts is not rejected. The estimated equation of the average propensity to consume out of GDP is the following:

$$TC = aR + bT + c(T - G) + dD(-1) + e$$

where TC is the average propensity to consume, social benefits excluded, R is disposable income without social security benefits, to which the specific taxes are added, the propensity to save on is under study (income tax, VAT and excise duties, social contributions), T are these different taxes, G is public consumption of the whole public sector corresponding to these taxes, i.e expenditures less investment less financial transfers less non-fiscal income of the production account, D(-1) is the one year lagged public debt in the Maastricht sense. All variables are divided by GDP.

Euro area (Luxembourg excepted), 2000-2010, within with fixed effects (121 observations).

Taxes	a	b	c	d	R2,Fischer
Overall (1)	0,24 (4,20)			0,03 (2,39)	0,99
Overall (2)	0,35 (6,53)		0,13 (5,64)	0,05 (4,47)	0,99 23,5
Income tax (3)	0,31 (5,17)		0,14 (3,02)	0,04 (3,38)	0,99 7,22
Income tax and VAT (4)	0,31 (5,42)		0,14 (3,62)	0,05 (3,56)	0,99 8,24
Income tax, VAT, social contrib. (5)	0,31 (5,57)		0,14 (4,16)	0,05 (3,74)	0,99 8,82
Income tax (6)	0,31 (5,23)	-0,18 (0,16)	0,11 (1,88)	0,04 (3,13)	0,99 3,92 SCR=95,7
Income tax, VAT (7)	0,32 (5,54)	-0,11 (0,77)	0,07 (1,10)	0,04 (3,04)	0,99 5,35 SCR=90,9
Income tax,	0,32	-0,20	0,11	0,04	0,99

VAT, soc. Contrib. (8)	(5,64)	(1,80)	(2,60)	(3,45)	4,90 SCR=89,1
H0 model 6	0,19 (4,40)	b=a	c=a	0,05 (4,29)	0,986 SCR=103,2
H0 model 7	0,18 (4,72)	b=a	c=a	0,05 (4,39)	0,986 SCR=100,9
H0 model 8	0,17 (5,10)	b=a	c=a	0,06 (4,54)	0,987 SCR=98,1

Fisher tests are computed when the H0 hypotheses corresponds to the equality of coefficients, critical values $F(2,108)\#4,82$, $F(1,108)\#6,90$.

Model (1) corresponds to the overall keynesian hypothesis with identical propensities to consume, model (2) to the overall ricardian one when the difference between taxes and expenditures is approximated by net lending. Models (3), (4) et (5) test the ricardian hypothesis on income tax to which duties (VAT), then social contributions are added. Expenditures are overall taxes less gross savings and social security benefits. In models (6), (7) et (8) propensities to save taxes are differentiated. According to Fisher tests, propensities to save taxes cannot be distinguished and the keynesian model cannot be refused. Fixed effects prevail.

Appendix 5: growth and external balance in the Euro area

Effects of external trade or net external wealth on growth are tested for the Euro area over the 1999-2010 period. Greece is supposed to have been belonging to since the very beginning and newcomers have been neglected. The area has also been split up according to their external surplus or deficit. The first category of countries includes Germany, Belgium, Finland, The Netherlands and Ireland; the second one Austria, Spain, France, Greece, Italy, Luxembourg and Portugal. This decomposition is very robust because Italy only changed of regime, running a surplus between 1999 and 2003 and a deficit since.

The estimation methods are chosen according to a Fischer test (the null hypothesis corresponding to the absence of fixed effects against the differentiation of constant terms) and a Hausman χ^2 test (the null hypothesis corresponds to independent fixed effects and the alternative one to random (correlated) effects. Without fixed effects, the within estimator is denominated A, with different fixed effects it is noted B, with random effect it is noted C. The coefficient θ is the ratio of the variance of individual residuals over total variance including variance of independent fixed effects, such that the within estimator corresponds to $\theta = 0$ and $\theta = 1$ to the stacked estimator. The greater the parameter θ, the more symmetrical the Euro area (from a statistical point of view).

Firstly, neither public debt, nor deficit are significantly different from 0. External net investment position is not overall significant either. We only present the estimates, which give satisfactory results :

TQ(1)=a*TXR+b1*TBAL(1)+b2*TBAL(2)+c
TQ(2)=a*TXR+b1*TPOSX(1)+b2*TPOSX(2)+c
TQ(3)=a*TXR+b1*TBALE+b2*TBALX+c

TQ is the GDP growth rate at constant price, TXR is the 10 years real interest rate, TBALE is the trade balance within the area, TBALX outside the area, TBAL the overall trade balance, which coefficients are distinguished into the surplus countries TBAL(1) and the deficit countries TBAL(2) and finally TPOSX is the overall investment external position, split according the same criterium.

Euro area (12 countries)

Variable	A	b1	b2	c	R2,F	Method
Overall Balance (1)	-0,007 (5,50)	(0,03) (1,06)	b2=b1	0,03 (0,39)	0,20	C, $\theta = 0,87$
Overall balance (1)	-0,007 (5,63)	0,12 (2,98)	-0,11 (2,11)	0,03 (5,33)	0,26 13,60	C, $\theta = 0,69$
External position (2)	-0,007 (5,30)	0,004 (0,36)	0,06 (4,17)	-	0,36 30,37	B, $\theta = 0,40$

Critical value of Fisher-Snedecor : 3,726

Euro zone: mercantilist countries: the trade surplus induces growth (3).

Variable	A	b1*TBALE	b2*TBALX	c	R2,F	Method
Overall balance (3)	-0,01 (5,14)	0,11 (2,19)	b2=b1	0,03 (4,30)	0,36 (0,60)	$C, \theta = 0,64$
Extra-area balance (3)	-0,01 (5,29)	-	0,09 (1,84)	0,05 (7,10)	0,35 (0,46)	$C, \theta = 0,70$
Intra-area Balanve (3)	-0,01 (4,71)	0,03 (0,48)	-	0,04 (4,04)	0,33 (2,44)	$C, \theta = 0,45$

Students and Fisher (fixed effects) in parentheses.

Euro area: keynesian countries: growth induces trade balance (3).

Variable	a	b1*TBALE	b2*TBALX	c	R2,F	Method
Overall balance (3)	-0,01 (3,07)	-0,62 (3,49)	b2=b1	-	0,34 (2,75)	$B, \theta = 0,39$
Overall balance (3)	-0,01 (2,59)	-	-0,10 (1,21)	0,02 (4,61)	0,15 (1,20)	$C, \theta = 0,85$
Euro balance (3)	-0,01 (3,61)	-0,24 (2,00)	-	0,02 (3,44)	0,24 (2,46)	$C, \theta = 0,43$

Students and Fisher (fixed effects) in parentheses.

The Euro area is heterogeneous because overall balance has no common effect but a positive effect in surplus countries and a negative effect in deficit countries. Net external investment position (in stocks) influences deficit countries only. In surplus countries, growth is strengthened by external trade towards the rest of the world excluding the Euro area and in deficit countries growth is greater, when the trade balance worsens towards the insider Euro area countries.
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Appendix 6: risk premium

Long term (10 years) interest rates on public debts are explained over the 2000-2008 and 2000-2010 periods with the ratios Public Debt/GDP and International Investment Position/GDP, with the ratio Taxes/Interest charges of debt and Interest charges/Taxes. Panel estimators are used. Inflation had to be removed because it is never significantly different from 0. Explanatory variables are yearly lagged (12x8 observations before the crisis, 12x11 thereafter). It is tested whether risk premia are fixed in absolute terms, relatively to the mean of the area or relatively to the dominating country, that is Germany. The corresponding 10 years interest rates are TX, DTX et ATX.

The choice of the econometric method, tests and notations are the same as in the two preceding appendices. The parameter θ is a coarse-grained evaluation of the symmetry of residuals.. An other purely economic definition of symmetry and dominance is grasped when risk premiums are defined according to the mean over countries (DTX) or in comparison with a dominating country (herein Germany, ATX). The transformed variables are the interest rate, the debt and the international position, but not taxes and interest charges.

The general equation is: TX=a+b*INT+c*DET+d*EXT, with INT the interest charges (Interest cost/GDP or Interest cost/taxes), DET public debt and EXT International investment position.

The coefficient of inflation and public deficit are never significantly different from 0 ; when the interest charges are introduced, debt is no more signbificant, the ratio interest/taxes is the best significant variable before the crisis.

Period 2000-2010

Variables	a	b	c	d	R2,F	Method
TX Int/GDP		0,12 (7,65)	-0,013 (1,32)	-0,003 (1,09)	0,46 (4,97)	$B, \theta = 0,21$
DTX Int/GDP	-0,64 (4,04)	0,48 (3,13)	0,016 (4,32)	-0,005 (4,61)	0,33 (1,99)	$C, \theta = 0,50$
ATX Int/GDP		0,93 (3,32)	0,06 (7,36)	-0,005 (2,69)	0,51 (3,31)	$B, \theta = 0,32$
TX int/ Taxes		0,12 (7,65)	-0,01 (1,32)	-0,003 (1,09)	0,46 (4,67)	$B, \theta = 0,22$
DTX int/ Taxes		0,03 (2,59)	0,02 (2,43)	-0,004 (2,54)	0,45 3,09	$B, \theta = 0,34$
ATX int/ Taxes		0,01 (0,07)	0,05 (5,13)	-0,006 (2,62)	0,45 (4,76)	$B, \theta = 0,22$
TX	3,95 (21,57)		0,006 (2,01)	-0,003 (2,15)	0,11 (1,19)	$C, \theta = 0,85$
DTX	-0,49 (2,80)		0,008 (3,16)	-0,004 (3,16)	0,31 (3,42)	$C, \theta = 0,31$
ATX			0,047 (6,29)	-0,006 (2,64)	0,45 (5,11)	$B, \theta = 0,21$

In parentheses, T student tests and Fisher test for fixed effects.

Period 2000-2008

Variables	a	b	c	d	R2,F	Méthode
TX Int/GDP		-3,32 (9,59)	-0,04 (2,86)	0,003 (1,15)	0,59 (6,65)	$B, \theta = 0,16$
DTX Int/GDP	-0,14 (2,13)	-0,22 (3,31)	-0,001 (0,82)	-0,0002 (0,47)	0,54 (2,17)	$C, \theta = 0,47$
ATX Int/GDP		-0,57 (4,67)	-0,009 (1,90)	0,001 (1,44)	0,61 (2,28)	$B, \theta = 0,46$
TX int/ Taxes		12,35 (6,58)	-0,02 (1,20)	-0,001 (0,48)	0,43 (3,99)	$B, \theta = 0,26$
DTX int/ Taxes		1,09 (2,17)	-0,003 (0,72)	0,007 (0,98)	0,59 (1,84)	$A, \theta = 0,55$
ATX int/ Taxes		1,98 (3,31)	-0,005 (0,96)	-0,001 (0,58)	0,56 (1,87)	$A, \theta = 0,55$
TX	4,09 (23,07)		0,005 (1,74)	-0,001 (0,92)	0,71 (0,54)	$A, \theta = 0,63$
DTX	-0,25 (4,89)		0,004 (4,68)	-0,001 (3,54)	0,48 (1,69)	$C, \theta = 0,60$
ATX	-0,13 (2,41)		0,004 (4,60)	-0,001 (3,62)	0,41 (1,18)	$C, \theta = 0,86$

In parentheses, T student tests and Fisher test for fixed effects.

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