

**FINANCIAL SUSTAINABILITY OF AN ECONOMY**  
**EXPLORATORY REMARKS**

*(Draft version, 7/2011)*

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## EXPLORATORY REMARKS

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The financial crisis has revealed that the growth regime characterizing the world before 2008 was unsustainable. In effect, despite the bright performance recorded in term of GDP increase during the 2003-2007 period, wealth was decreasing. The increased indebtedness of households was matched by overvaluated assets. When assets prices returned to earth the sheer reality appeared: we were poorer. This episode remember us a fundamental, although intuitive, fact: a process is sustainable if it does not lead us to consume so to speak the capital out of which we obtain our income. It is why an indicator of sustainability is so important to evaluate the macro economic performance of an economy and the strategy of countries.

The debate around public debt which is raging nowadays, especially in Europe, hit at this issue although in a very partial way. Gross public debt, in effect, is only one of the many determinants of the wealth of Nations. But the way the debate is phrased influence the markets and policy making, whether we like it or not. Rising public debt and increasing pressure from financial markets regarding short term financing of public sector have underlined the risk attached with a non sustainable trajectory of the economy. Markets sanction is supposed to be immediate if the “right” decisions are not taken to restore sustainability.

One of the characteristic of a sustainable path is the ability to borrow at a ‘reasonable’ rate. A ‘reasonable’ rate is both not too high in real terms and not too different from rates charged to other agents. The notion of a reasonable rate can change dramatically with

time (and the focus of economic policy). For instance, in the first part of the 1990's, it was not unusual for large countries to borrow at a real rate around 10%. At that time, disinflation was the main objective, and governments did not bother with sustainability. That may explain why the growing public debt due to such high interest rates did not raise much concern. In today context, a reasonable (real) rate should be around 2% and well below 5%... In order to repay and to carry on debt, it is necessary to borrow continuously, that is to borrow again what has been reimbursed. The ability to borrow is thus essential to the management of the public debt. The so called perpetual debt is in fact a succession of "borrow and reimburse" operations, contrary to the ancient practice of perpetual rent (or debt). It is thus conditional on the finding of someone willing to lend in the future. Today, Governments have no means to force lending, contrary to what could have been the case in the recent past, when capital account were not open to international flows.

Sustainability is not or should not be a matter of financial pressure, i.e. of short term considerations, but rather a concern of intergenerational fairness: we do not want to let future generations pay our share. Of course, this implies to assess a full account of what we bequeath to future generations, debt on one side, but financial and non financial assets on the other, the valuation of which can be controversial.

Sharing a common currency in a global crisis, Euro area countries are currently giving much importance to short term considerations and asking for sustainability indicators in order to assess the position of each country. They are aiming at the definition of sustainability objectives and the implementation of economic policies "sustainability friendly", in order to spread information to financial markets and thus to reduce pressure on public and private sectors borrowing.

The quest for "the" indicator, summarizing "all you need to know" about sustainability, is the quest for Graal. There is simply no such indicator. We will, instead, explore various indicators, carrying different logics and displaying different results, and then compare the results. No definition will reveal itself as satisfactory and the various ones we will consider may even lead to conflicting results regarding, for instance, the ranking of countries with respect to the criteria of sustainability.

The reason is that sustainability depends heavily of what will be done in the future. It depends on the past only "ex-post" if we may say so, that is once it is already broken. Greece is not bankrupt, but is threatened to be so. Financial markets judgment is at best

no more than an educated guess about the future. That lay the reasons why it is so important to devise institutions and procedures allowing for sound decisions in the future. Relying on the values of a set of indicators will never be sufficient. They are nonetheless useful as they carry information on the path followed by economies. As such, they are necessary elements to the decision process.

We explore various indicators, discussing their meaning and limitations and we apply them to a set of countries during different time periods. The set is composed of OECD developed countries, large enough to be of interest, for which data is available with sufficient quality (see annex 1 for a description of data). For all those countries we have access to financial balance sheets. For a reduced set of countries, we also have access to non financial balance sheet, allowing to construct a more extensive report on wealth. For some indicators, France only will be considered, because some complex transformation are applied to balance sheets.

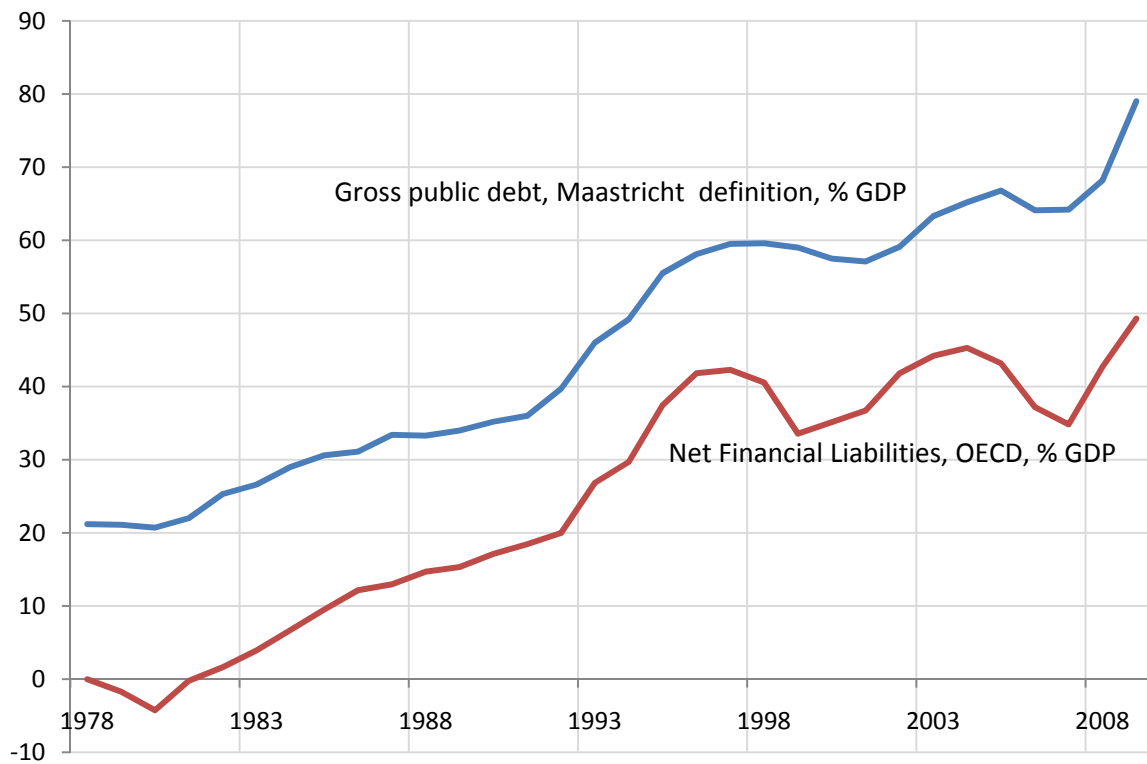
## I. PUBLIC SECTOR DEFICIT AND DEBT: THE STARTING POINT

Public deficit is considered as the main sustainability indicator, although its wide use is over estimating its accuracy. It is better to deal with it as one of the many components of sustainability. The raw measure is current deficit, expressed as a share of GDP; more sophisticated concepts are primary balance and structural balance.

Unsurprisingly, public sector deficits and debts have been rising rapidly during the crisis. They appear also to have increased over the years, since the 80's, displaying a pattern of steady rise, reinforcing the idea that public finance in most countries is "unsustainable". We focus here on debt instead of deficits, because debt cumulates deficits over time (plus other adjustments) and thus keeps track of all changes in deficits.

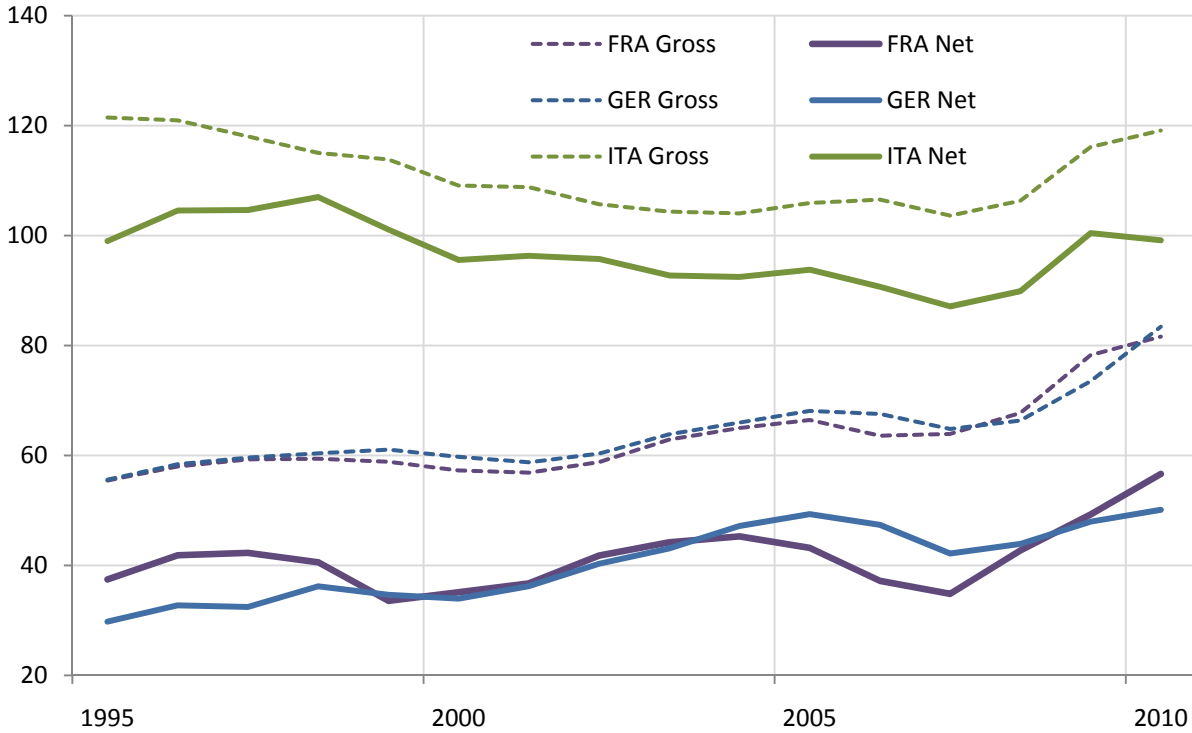
Two definitions are available for public's deficit and debt. The first one is the Maastricht concept, defined by a treaty and applied by European Union countries. The other is the variation of the opposite of 'General government net financial liabilities' as collected by the OECD. The two concepts differ in the definition of the public sector and also because the Maastricht concept is a gross one, accounting for financial liabilities (gross debt), not netting liabilities with financial assets. The reason was to prevent data manipulation by states when valuing state owned firms as their shares are not exchanged on a market. This precaution is largely outdated considering the evolution of the composition and nature of state owned assets: most public enterprises have been partially or totally privatized and the others transformed in stock companies. Fig.1 displays the two concepts for France from 1978 to 2009. Net Liabilities appears to be stable since the mid 90's, while Gross debt as a percent of GDP has been rising. This shows the importance of taking into account both sides of the financial balance sheet. In 2008 and 2009, the worsening of net position has been wider than that of gross debt. This is due, besides the increase in gross debt, to the depreciation of financial assets.

Fig.1: Maastricht vs Net Liabilities, France, 1978-2009



Source: French national accounts, debt notification, may 2011.

Fig.2: Maastricht vs Net Liabilities, France, Germany&Italy, 1995-2010



Source : OECD Economic Outlook #89, june 2011.

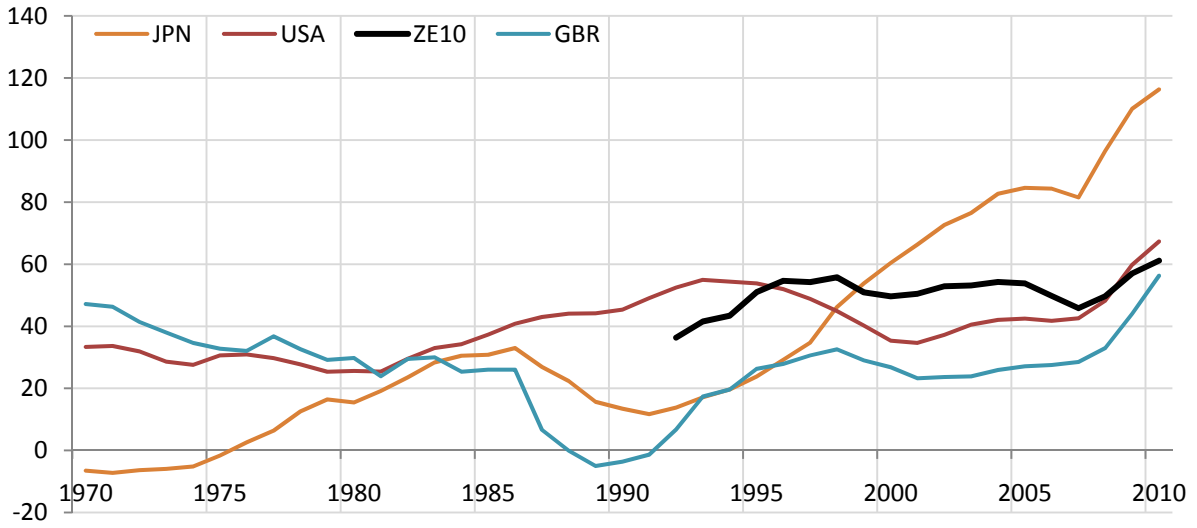
In Italy both liabilities in the Maastricht sense and net liabilities were decreasing slowly but steadily since the end of the 90s. German net public debt has been rising over the last 10 years when French net debt was roughly stable. In 2007, net German position was worse than French one, scoring 43% GDP against 34%. France was this year in a better position than most developed and large countries (USA was 42%, UK 29%, Japan 81% and Italy 87%).

Fig.3a, b and c display net financial liabilities for various countries. Net financial liabilities exhibit an upward trend over the last 40 years for most countries. Net liabilities as a share of GDP has increased in Italy, France, Germany, Belgium. It has slightly increased in USA but remained stable in the UK, displaying even a decrease at the turn of the 90's. In some smaller countries it has decreased, like for instance in Spain and Ireland.

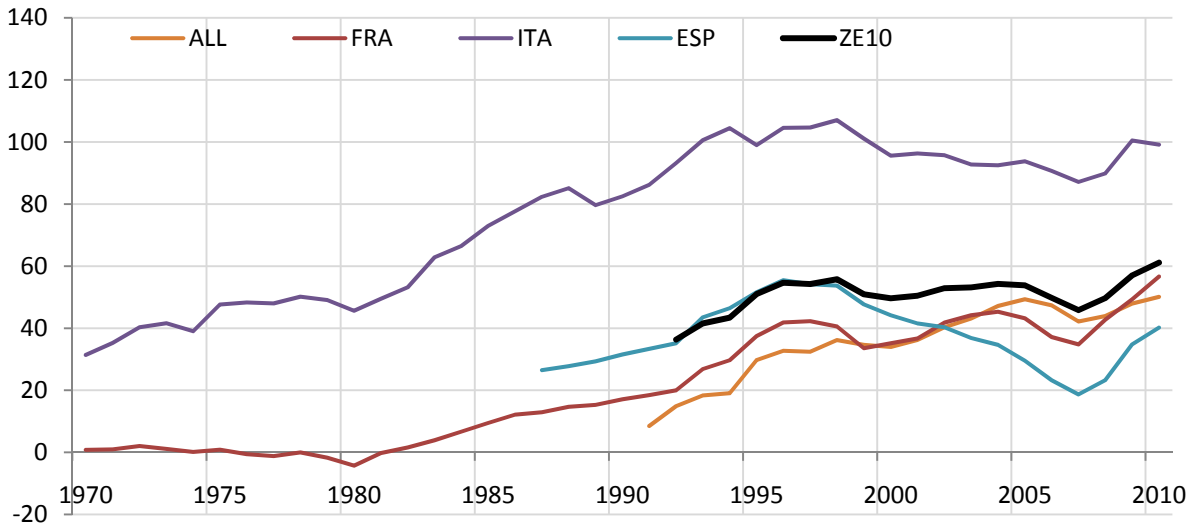
In 2008 and 2009 it has increased in all countries. The Great Recession and the fiscal responses it prompted are the main explanations of this phenomenon.

Before the crisis, i.e. up to the year 2007, net liabilities to GDP ratios were stable in a few countries: USA, France, and Euro Zone as a whole. It was increasing, at a modest pace, in Germany and United Kingdom and more rapidly in Japan. It was decreasing in Italy and in smaller countries.

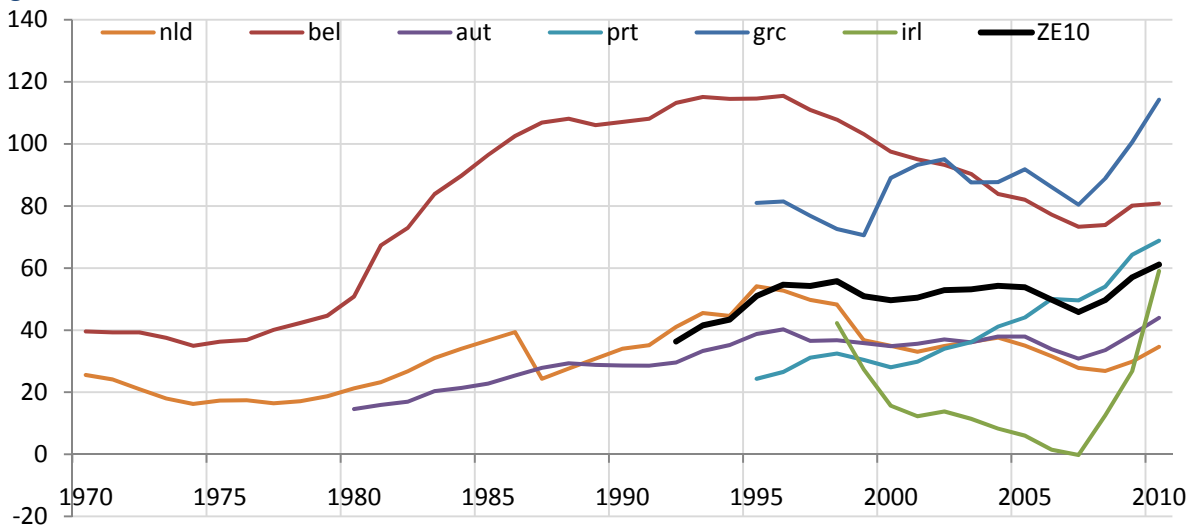
**Fig.3a: Net financial liabilities, % GDP**



**Fig.3b: Net financial liabilities, % GDP, larger ZE countries**



**Fig.3c: Net financial liabilities, % GDP, smaller ZE countries**



Source : OECD Economic Outlook #89, june 2011.



## II. TAX GAP: LOOKING FORWARD

The tax gap concept is an important one because it gives insights into the future. It is a forward looking concept as it sheds light on future action besides summarizing past history. The notion of tax gap is closely related to public deficit and debt. It is the amount of tax increase (or public spending decrease) necessary to stabilize public debt (either gross or net, but we concentrate hereafter on net debt only), given a debt target, a real interest rate and a growth forecast. The arithmetic behind the tax gap is simple;  $s_p$  stands for public primary surplus (current balance minus interest on debt paid) as a percent of GDP,  $i$  for real interest rate,  $g$  for real growth and  $d$  for debt in % of GDP. The condition for the stability of debt to GDP ratio is that the primary surplus ( $s_p$ ) equals  $s^*$ , where  $s^*$  is thus defined:

$$s^* = -d.(g-i)$$

When  $s_p$  is greater than  $s^*$ , debt decreases. Structural primary balance is defined as the structural balance that would prevail if the output gap were nil. It is approximately to:

$ss_p = s_p - .5.gap$ . In effect, calculations from OECD and IMF tend to show that elasticities of primary balance to output gaps are close to .5 for developed countries.

Table 1 displays the tax gap calculated for the year 2007. For each country, input data for tax gap calculation is extracted from OECD Economic outlook.

**Table 1: Tax gap in 2007**

	Growth: g	Output gap	Primary surplus: $s_p$	Structural primary balance: $ss_p$	Net Public debt: d	Primary surplus for the stability of debt: $s^*$	Tax Gap
USA	2.3	1.2	-1.0	-1.6	43	-0.1	1.5
GBR	2.0	2.7	-1.0	-2.3	28	0.0	2.3
JPN	0.7	2.5	-1.8	-3.0	81	1.0	4.0
DEU	1.3	1.9	2.7	1.8	42	0.3	-1.5
FRA	1.9	0.8	-0.3	-0.7	35	0.1	0.7
ITA	0.8	2.2	3.3	2.2	87	1.1	-1.1
ESP	3.6	0.2	3.0	2.9	19	-0.3	-3.2
nld	1.8	2.3	1.8	0.6	28	0.0	-0.6
bel	2.3	1.1	3.3	2.8	73	-0.2	-3.0
aut	1.9	2.1	1.1	0.0	31	0.0	0.0
prt	1.0	0.1	-0.2	-0.3	50	0.5	0.8
grc	2.9	1.9	-2.3	-3.2	80	-0.7	2.5
irl	4.4	4.8	1.0	-1.4	0	0.0	1.4

Source: OECD Economic Outlook #89, June 2011. Structural primary balance is defined as Primary balance minus  $.5 \cdot \text{GAP}$ . Tax gap is structural primary balance minus  $s^*$ . A positive tax gap means that one should raise taxes in order to stabilize net debt. Real interest rate is supposed to be 2% for all countries.

In 2007, most euro zone countries had a negative tax gap, meaning that their net public liabilities were decreasing (fig.3b and c). Tax gap for France and Ireland were positive, but net liabilities of France and Ireland were under 50% of GDP, which is the weighted average of the sample considered here. Greece had both a positive tax gap and net liabilities over the average; it was the only country needing specific measures in order to assure debt stability.

USA, United Kingdom and Japan were at this time in a situation of strongly positive tax gap, meaning that their net liabilities were rising (fig.3a) in sharp contrast with Euro area countries and the rest of the world.

Although, output gap as provided by OECD is strongly dependent on most recent development in economic outlook. By reducing output from 2008 to 2010, the outburst of the crisis has led OECD economists to revise output gap upward for the years before the crisis, as if before the crisis, activity was over of potential, thus announcing the coming crisis. Of course, this is a reconstruction of the past. In June 2008, OECD estimates for output gaps were less positive as shown in table 2. Those major revisions have led to reconsider the fiscal position of most developed countries. In 2007, Japan and Greece had a positive tax gap, whereas moderate. All other countries were close to balance or were reducing their public liabilities.

**Table 2: Output gap and potential growth revision, 2007**

	Output Gap 2007 data	Pot. growth 2007 data	Tax gap 2007 data	Output Gap 2011 data	Pot. growth 2011 data	Tax gap 2011 data
USA	-1.0	2.5	<b>0.3</b>	1.2	2.3	<b>1.5</b>
GBR	-1.0	2.6	<b>0.3</b>	2.7	2.0	<b>2.3</b>
JPN	-1.7	1.6	<b>1.2</b>	2.5	0.7	<b>4.0</b>
DEU	2.4	1.5	<b>-1.0</b>	1.9	1.3	<b>-1.5</b>
FRA	-0.2	1.9	<b>0.1</b>	0.8	1.9	<b>0.7</b>
ITA	2.5	1.5	<b>-0.8</b>	2.2	0.8	<b>-1.1</b>
ESP	3.3	3.3	<b>-1.9</b>	0.2	3.6	<b>-3.2</b>
Nld	2.2	1.8	<b>-1.0</b>	2.3	1.8	<b>-0.6</b>
Bel	3.5	2.5	<b>-2.1</b>	1.1	2.3	<b>-3.0</b>
Aut	1.4	2.2	<b>-0.8</b>	2.1	1.9	<b>0.0</b>
Prt	0.2	1.9	<b>-0.1</b>	0.1	1.0	<b>0.8</b>
Grc	1.0	4.3	<b>-2.1</b>	1.9	2.9	<b>2.5</b>
Irl	0.2	4.9	<b>-0.1</b>	4.8	4.4	<b>1.4</b>

Source: OECD Economic Outlook #89, June 2011 and OECD Economic Outlook #83, June 2008. Table 1 notes apply.

Table 3 is an update for the year 2010 of table 1. Output gaps are (algebraically) strongly reduced as they became strongly negative; potential growth is lower and primary surplus are down. As net liabilities are up, tax gaps are increasing, sometimes dramatically. Fig.4a shows an interesting property of tax gap as calculated here. It seems that it exist a correlation between their levels in 2007 and in 2010. This could be an argument in favor of a low (or even negative) tax gap as it appears to be an element for future stability. But correlation is far from unity (0.25).

However one should remember that the tax gap for 2010 is related to the one in 2007 as it relies on structural balance in both years ; obviously having a better balance in 2007 means starting closer to balance and thus, other things being equal, being also closer to balance after a common shock. Fig.4b resolves this question by using variation of tax gap instead of level for the year 2010. Then, correlation disappears.

**Table 3: Tax gap in 2010**

	g	gap	$s_p$	$ss_p$	d	$s^*$	Tax Gap1
USA	1.6	-3.8	-9.0	-7.1	67	0.3	7.3
GBR	0.2	-3.6	-7.7	-5.9	56	1.0	6.9
JPN	0.9	-3.6	-6.7	-4.9	116	1.3	6.2
DEU	1.1	-2.5	-1.3	-0.1	50	0.4	0.5
FRA	1.2	-4.1	-4.7	-2.7	57	0.5	3.1
ITA	-0.1	-3.6	-0.3	1.5	99	2.1	0.6
ESP	0.7	-7.5	-7.7	-4.0	40	0.5	4.5
NLD	1.2	-2.6	-4.1	-2.8	35	0.3	3.1
BEL	1.3	-3.3	-0.9	0.8	81	0.5	-0.2
AUT	1.8	-3.0	-2.6	-1.1	44	0.1	1.2
PRT	0.5	-2.9	-6.1	-4.7	69	1.0	5.7
GRC	0.8	-8.2	-5.1	-1.0	114	1.3	2.3
IRL	-0.3	-10.2	-10.0	-4.9	59	1.4	6.3

Source : OECD Economic Outlook, june 2011. Table 1 notes apply.

Calculation of tax gap relies on various assumptions. Potential growth is one of them and potential growth as calculated by OECD is highly volatile. There are many reasons to believe that growth could be reduced as a consequence of the financial crisis, but at this point this remains a hypothesis. The estimation of the output gap is grounded on the same hypothesis as potential growth and output gap are closely related (one being the integration of the other). However, because the economic crisis is a discontinuity, the relation between the two notions becomes fuzzy. Table 4b displays 4 measures of tax gaps calculated with alternative hypotheses. We can in effect use two definitions of each of the components determining the tax gap. Potential growth may be defined as the OECD one (table 2) or as the (forecasted) growth of working age population plus 1%, the latter standing for the growth of labor productivity. In this second definition, potential labor productivity is supposed to be equal among countries, neglecting all factors that could contribute to divergences, including different choices in productive combination. Globalization is supposed here to be perfect (in a neutral sense however), which means that the diffusion process among developed countries insure the equalization of labor and total factor productivities. This strong hypothesis offers a more structural view of potential growth than the one behind the calculations of OECD, based more on the observation of medium term swings in growth than on anything else.

The second component, the output gap, can also be measured in two alternatives ways. The first is the OECD one. The second is derived from the “unemployment gap” that is the difference between unemployment as a share of active population and 5%. This definition may seem arbitrary: why 5% and not the NAIRU? The reason is that that the NAIRU is a short term notion and that if it differs among countries it is above all because of

differences in (labor) market regulations and institutions. The crude concept we use here, beside its simplicity could be understood as a long term one, allowing for institution and regulation reforms.

The different combinations of these two alternative hypotheses lead to 4 possible measures for the tax gap (table 4b).

On average, the alternative measures of tax gaps are rather close. The concept seems to be robust as its measurement does not depend too much on the various hypotheses one can make about its components. However, for some countries – mainly Germany, Italy, Belgium or Netherland – its level can vary sizably according to the assumption used. In this respect, the hypothesis which presides over the measurement of output gaps is crucial. Has the crisis affected permanently potential outputs in the rich countries? If yes the tax gap would be higher *ceteris paribus*. If not, the picture would look brighter. The answer given by the OECD is essentially yes. It is why output gaps for the year 2010, according to the OECD, are lower than in 2010, which means that whatever mild has been the recovery in 2010, it was enough to reduce the discrepancy between potential output and actual one. For example for Germany this hypothesis leads to a tax gap of -0.6 instead of +0.5 when using an alternative one. There are no strong arguments in favor of one or the other hypothesis. But until we understand why growth paths would have been permanently reduced by the crisis, the OECD measure should be considered as no more than an educated guess.

Regarding Greece and some other countries for which there has been a lot of concern about their public finance situation, table 4c develop two points. The first one is that interest rates do matter for the tax gap. Instead of a conventional 2% real annual rate of interest as used in previous calculation, tax gap 1bis is calculated using market interest rates. Using such rates does not change the tax gap for most countries. For Greece, it increases tax gap by 6.6 points. Stabilizing public finance if forced to borrow at such a rate will require a tremendous effort. On the other side, if 2% real rate was proposed to Greece, reduction in primary deficit achieved in 2010 would be nearly sufficient. The second point concerns the targeted level of public liabilities. Second part of table 4c display tax gaps necessary to aim 50% GDP net liabilities in 25 years. As Germany is presently at 50% net public liabilities, tax gap 1ter is equal to tax gap 1. For Japan, Greece, Belgium and Italy, tax gap is raised by a point or more if a target was to be respected.

Fig.4a: Tax gap 2007 vs Tax gap 2010 (TG1)

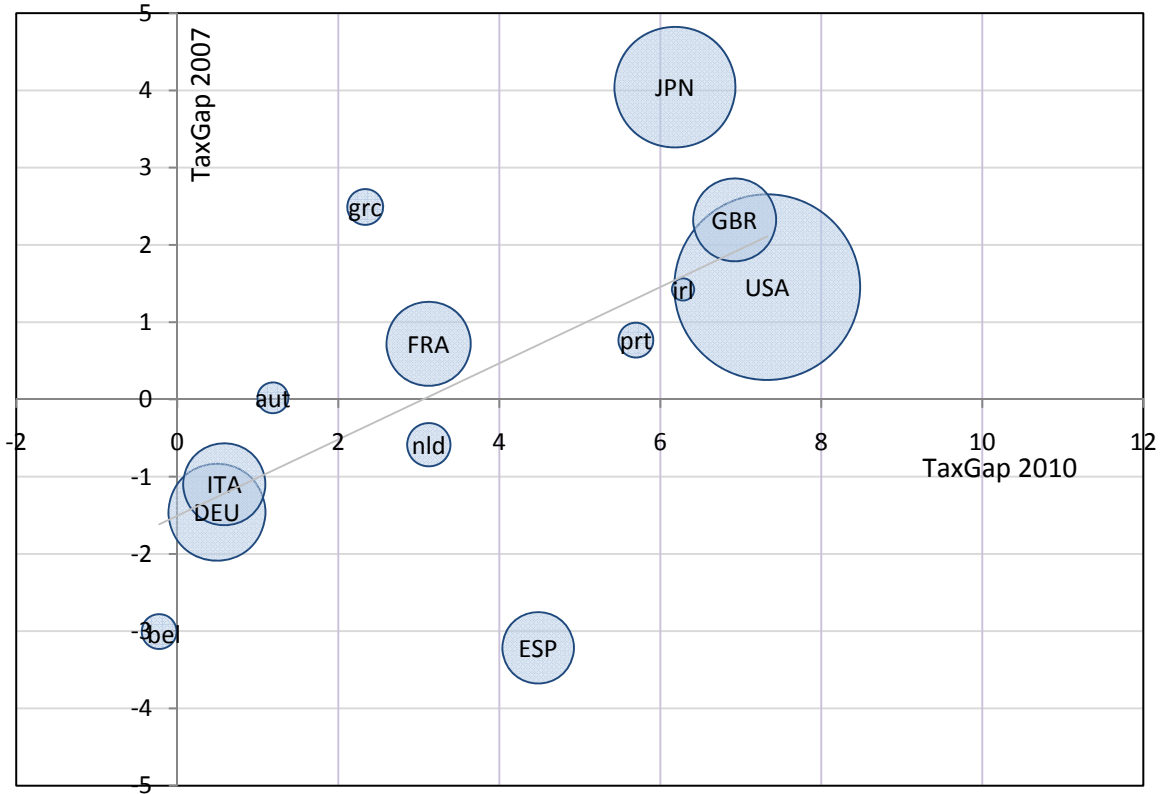
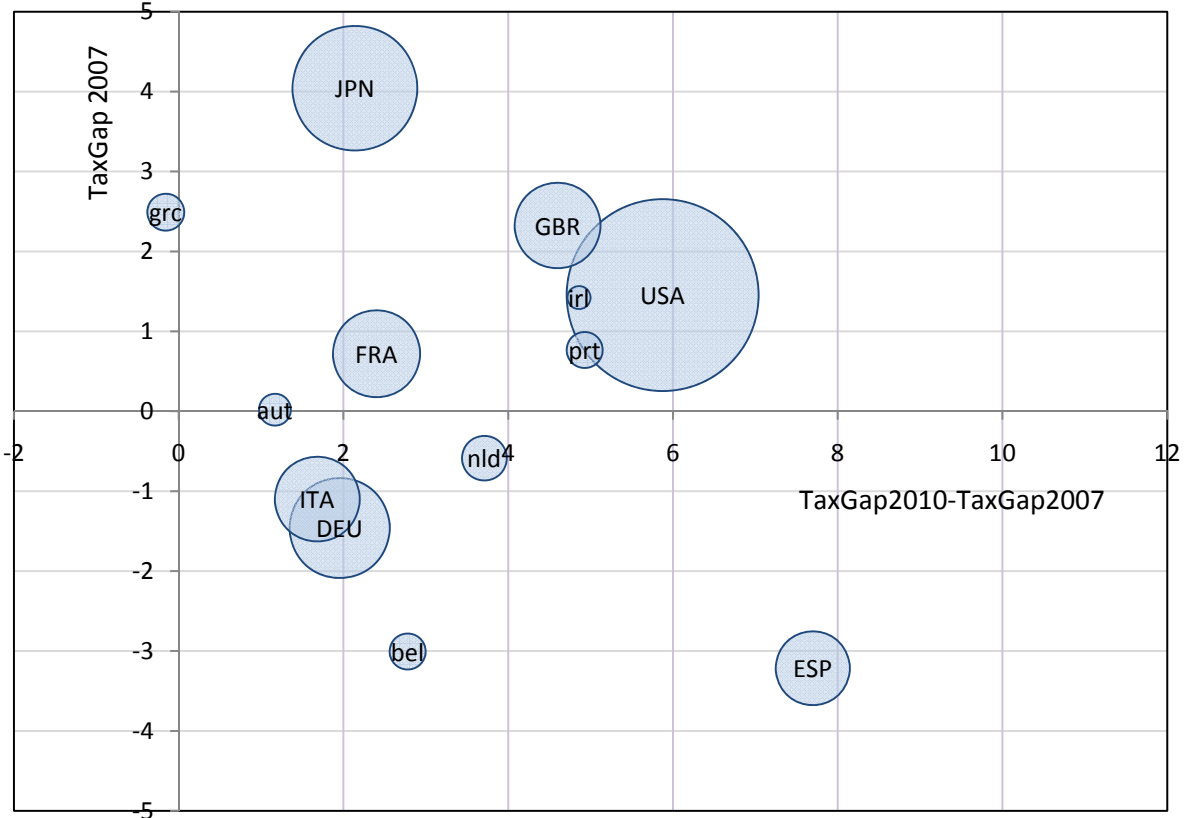


Fig.4b: Tax gap 2007 vs Δ( Tax gap) (TG1)



Source : OECD Economic Outlook #89, june 2011. See tables 1&2 for details. Surface of the circle is proportional to population.

**Table 4a: Potential growth and output gap**

	Gap (OECD, 2010)	Gap (UNR-5%, 2010)	Pot. Growth (OECD, 2010)	Pot. growth (WAPop+1%, 2010)
USA	-3.8	-4.6	1.6	2.0
GBR	-3.6	-2.9	0.2	1.5
JPN	-3.6	-0.1	0.9	0.1
DEU	-2.5	-1.8	1.1	0.5
FRA	-4.1	-4.3	1.2	1.5
ITA	-3.6	-3.4	-0.1	1.5
ESP	-7.5	-15.1	0.7	2.0
NLD	-2.6	0.7	1.2	1.2
BEL	-3.3	-3.3	1.3	1.9
AUT	-3.0	0.6	1.8	1.3
PRT	-2.9	-5.8	0.5	1.1
GRC	-8.2	-7.5	0.8	1.3
IRL	-10.2	-8.5	-0.3	2.2

**Table 4b: Alternative Tax gaps, year 2010**

	Tax Gap 1 gap/pot OECD	Tax gap 2 gap OECD/pot WAP	Tax Gap 3 gap UNR/pot OECD	Tax Gap 4 gap UNR/pot WAP
USA	7.3	7.1	6.9	6.7
GBR	6.9	6.2	7.3	6.6
JPN	6.2	7.1	7.9	8.8
DEU	0.5	0.8	0.8	1.1
FRA	3.1	3.0	3.0	2.9
ITA	0.6	-1.0	0.7	-0.9
ESP	4.5	4.0	0.7	0.2
NLD	3.1	3.1	4.8	4.7
BEL	-0.2	-0.6	-0.2	-0.6
AUT	1.2	1.4	3.0	3.2
PRT	5.7	5.3	4.2	3.9
GRC	2.3	1.8	2.6	2.1
IRL	9.2	7.7	10.0	8.6

**Table 4c: Tax gaps, year 2010, market interest rates, targeted public debt (25y)**

	Tax gap 1bis gap/pot OECD, IRm	Tax gap 1bis-1	TaxGap 1ter gap/pot OECD, d=0.5	Tax gap 1ter-1
USA	7.4	0.1	8.0	0.6
GBR	7.2	0.3	7.1	0.1
JPN	4.1	-2.1	8.1	1.9
DEU	0.3	-0.2	0.5	0.0
FRA	3.1	0.0	3.3	0.2
ITA	1.4	0.8	1.5	0.9
ESP	4.9	0.4	4.2	-0.3
NLD	3.0	-0.1	2.6	-0.5
BEL	0.0	0.3	0.8	1.0
AUT	1.3	0.1	1.0	-0.2
PRT	7.3	1.6	6.2	0.5
GRC	8.9	6.6	4.2	1.8
IRL	11.0	1.8	9.3	0.2

Source : OECD Economic Outlook #89, june 2011. Output gap is either from OECD Economic Outlook, june 2011, or equal to Rate of unemployment (UNR) minus 5%. Potential growth is either from OECD Economic Outlook #89, june 2011, or equal to working age population forecasted evolution plus 1%.

During the crisis, the worsening of tax gaps is due both to automatic stabilizers and to the stimulus packages implemented in most countries ( Table 5).

**Table 5: Fiscal stimulus and tax gap**

	Fiscal stimulus 2009+2010	Taxgap 2010	Taxgap 2010- Taxgap 2007
USA	5.6	7.3	5.9
GBR	1.4	6.9	4.6
JPN	2.0	6.2	2.1
DEU	3.0	0.5	2.0
FRA	0.6	3.1	2.4
ITA	0.0	0.6	1.7
ESP	3.5	4.5	7.7
nld	1.5	3.1	3.7
bel	1.6	-0.2	2.8
aut	1.1	1.2	1.2
prt	0.8	5.7	4.9
grc	n/a	2.3	-0.2
irl	-4.4	9.2	7.8

Source : OECD Economic Outlook, june 2010&OECD. Fiscal stimulus is the variation of the structural deficit (opposite to structural balance).Tax gap is def1.



### III. A BROADER APPROACH TO SUSTAINABILITY: TAKING INTO ACCOUNT THE PRIVATE SECTOR

Public deficit and public debt, net or gross, are very crude indicators of future collective commitments and even cruder indicator of sustainability. What matters for sustainability is the evolution of the wealth of Nations<sup>1</sup>. Limiting ourselves for the moment to the public sector, that implies at least three things. First debt should be balanced by assets. Second debt should be properly measured in taking into account also the implicit debt (a point stressed extensively by Kotlikoff). And third assets should be accounted for in an extended way. The logic is to separate a dead weight financial commitment (paying a flow of money to someone for no special reason) from a flow of payment linked to a flow of revenue or well being. If the government borrows for education, then the flow of debt service to that purpose should be balanced by the flow of revenue accruing from education (a point made extensively by Eisner).

The theoretical solution is thus extended wealth accounts, extended to the point we are able to add on one side flow of explicit payment, discounted value of future commitments (implicit debt), flow of revenue linked to investments and flow of well being generated by the act of debt (implicit or explicit). Such a calculation may be broken down by generations (Kolikoff again).

As the aim is to assess the sustainability of the public sector, it is necessary to include in the picture everything which is public. The accounting framework should thus be extended to account for the consequences of economic process on the value of all kind of assets, producing either collective flow of revenue or well being, i.e. to public produced assets (Stiglitz *et al.*). The framework should be extended to natural assets so as to include the impact of economic activity on the environment.

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<sup>1</sup> Many critics have since long addressed this question from Eisner to Kotlikoff, fueling economic thought on accounting principles.

The building of extended accounts is a long and difficult process, in view of the scarce availability of data. Part of the lack of data is due to the cost of collection, another part is due to the absence of markets for the goods we want to evaluate, and still another to the complexity of the measurement of a good – capital – the value of which depends on expectations about the future. The main hurdle that many scholars have met was precisely that: the valuation of assets and liabilities (whether explicit or implicit) depends heavily on the scenario we built about the future. Kotlikoff adopted the solution of choosing “conventional” trends as a forecast. But, by no means, future paths can be approached by trends in view of the true uncertainty we are facing, and the numerous discontinuities which so far have characterized economic evolution. The only way is to build a dynamic model, making all assumptions explicit, while knowing that even the most sophisticated model will never deliver a revealed truth

We live to future work the building of such a model allowing for the valuation of all type of assets and liabilities.

We instead focus on available measures of the wealth of countries. We consider that to approach the question of sustainability in a satisfactory way, we have to consider jointly the public and the private sectors. The idea is that at the end the unsustainability of the net debt of the public sector will fall on the shoulders of households, even if we have no detailed knowledge of the way this burden will be shared among households. Conversely if government finances are prosperous, households will benefit from it. In other words as the burden of collective commitments or the fruits of public investment (at large, i.e. including public goods) will add up to private wealth, sheer logic implies that we analyze both sectors together.

To illustrate, we assume that two countries, identical *ab initio*, are following two different strategies. The first of them decides to maintain a wide public sector deficit, both to foster growth and to let households accumulate wealth. It may then decide, if and when its objectives would be reached, to liquidate at once the public debt. The other country, on the contrary, follows a strategy of a permanently balanced budget. The wealth of the two countries may not differ at this point, for they have just accounted differently what is

private and public<sup>2</sup> . However, the two countries may experience very different development paths if the accounting rule has an impact on public and private investment.

We thus propose to calculate ratios reflecting the solvency of an economy as a whole. In section I and II we consider liquidity ratios, assessing the risk of being not able to borrow in the short term. Short term ratios are important, even if liquidity is, at the end, dependant only on long term solvency.

### *Some ratios for France*

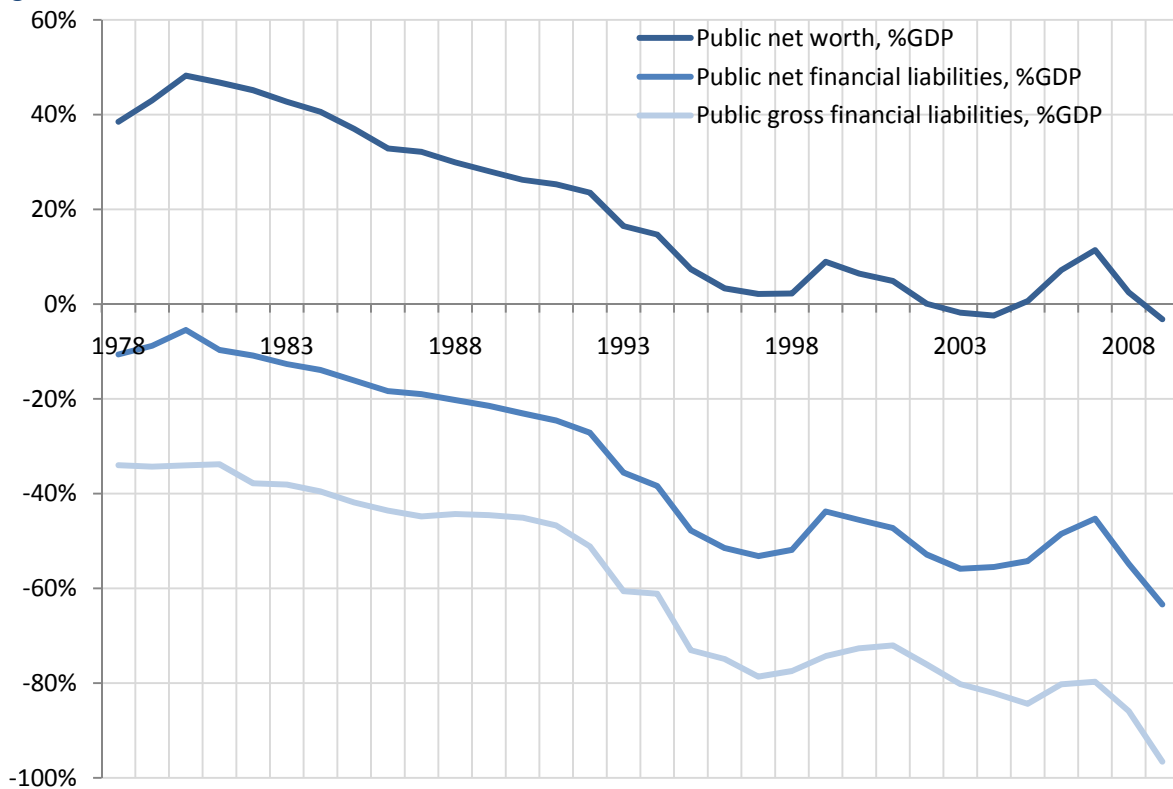
Wealth accounts are a sophistication of existing national accounts. Few countries in the world do publish wealth accounts even if it exists international accounting standards to define the way they should be constructed. Among pioneering countries are the United States, the United Kingdom, France, Japan, and Australia. The majority of European countries do not publish full wealth accounts but only financial accounts. The difference is important as financial wealth do not account for physical assets. Thus, households account is underestimated by the value of real estates while the business account relies on the assumption of a correct valuation by markets.

We will later proceed to international comparison based on financial wealth accounts. Here we consider the full wealth accounts for France. Fig.5 displays some ratios for the public sector in France. Two of them have already been represented in fig.1, 2 and 3. The public net worth to GDP is new. Net worth is net financial worth (negative for France), plus physical assets owned by the French government and local authorities. Physical assets are mainly residential commercial or office structures, and infrastructures. Special structure like Musée du Louvre is not accounted for. Land value is deducted from the assets (see note of fig.6).

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<sup>2</sup> A similar point was made by Kotlikoff in a famous numerical example

Fig.5: Public sector ratio to GDP

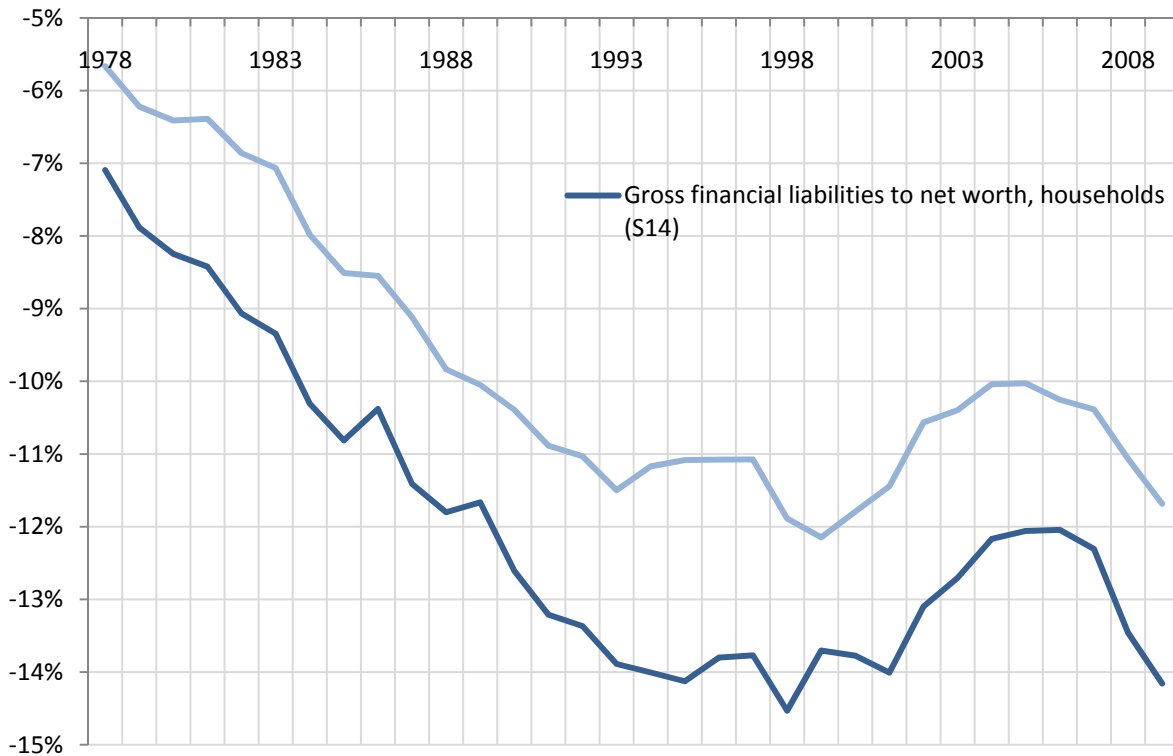


Source : French national wealth account, july 2010. Net worth is financial assets plus physical assets, except land property, minus financial liabilities. Public is sector S13. Liabilities are negative, assets are positive.

Fig.5 shows that public sector net worth since the beginning of the 90s has been positive, suggesting that increases in debt were matched by net investment in structures. However, it has strongly declined since the 70's and has been stable but near zero for the last 10 years. Drop in assets value and increase in public debt has not lead to a strong deterioration of public net worth since the 90s. The history of the increase of debt in the 80' could be explained by the existence of a reserve of value in the public sector at the outset, i.e. collateral not used for debt leverage, and that the increase in debt was made possible by the use of this collateral. Since the mid 90's, the leverage is constant. It is worth emphasizing that these calculations are based on a conservative hypothesis (which does not apply to households and banks) according to which land property is not considered as an asset, its valuation being too risky.

Gross financial liabilities of households are mainly long term debt vis à vis the banking sector and remain low when compared to the net worth of households (fig.6). The ratio has nevertheless doubled over the last 30 years, remaining stable since the early 90's. The large swing in assets valuation (before 2000 and after the crisis) explains the variation of the ratio since 2001.

Fig.6: Household liabilities to households' net worth



Source : French national wealth accounts, July 2010. Net worth is financial assets + physical assets – financial liabilities. Net worth augmented is net worth plus net worth of financial and non financial business. In French national accounts financial and non financial business net worth, including shares in liabilities, is not zero. Value of land property is removed from net worth augmented, based on the fact that land value could increase a lot (when there is a housing bubble) and that this value is purely internal value : land has a value because your neighbor values this land. Nevertheless, housing is included, and valued at construction cost. Households' net worth augmented is thus less polluted by housing bubbles

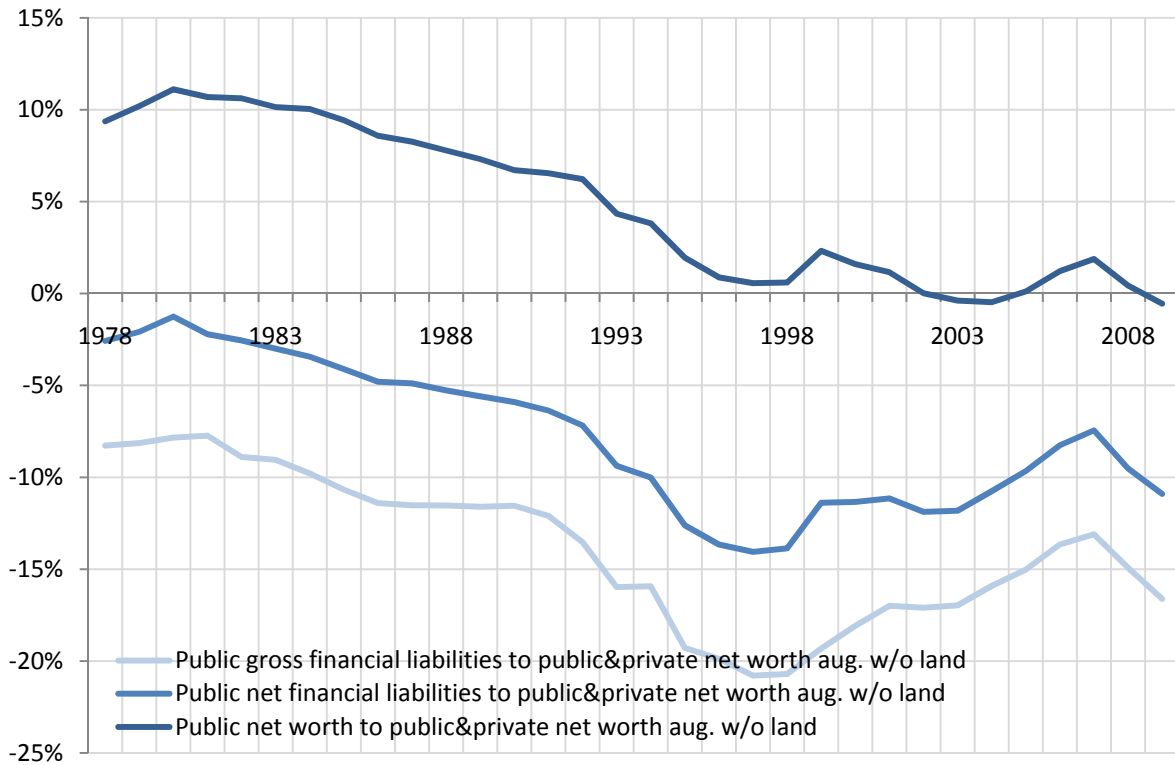
Fig.7 is symmetric to fig.5, but uses the sum of private and public net worth as a denominator instead of GDP. It is more coherent as it expresses a stock in per cent of a stock rather than of a flow. It is thus more representative of the solvency of the tax payer—its capacity to repay the public debt, given that public assets could be liquidated.

Leverage (gross or net liabilities over net worth)<sup>3</sup> did decrease since the mid 90's. Even if it increased during the crisis, it remains lower to its level of 1997.

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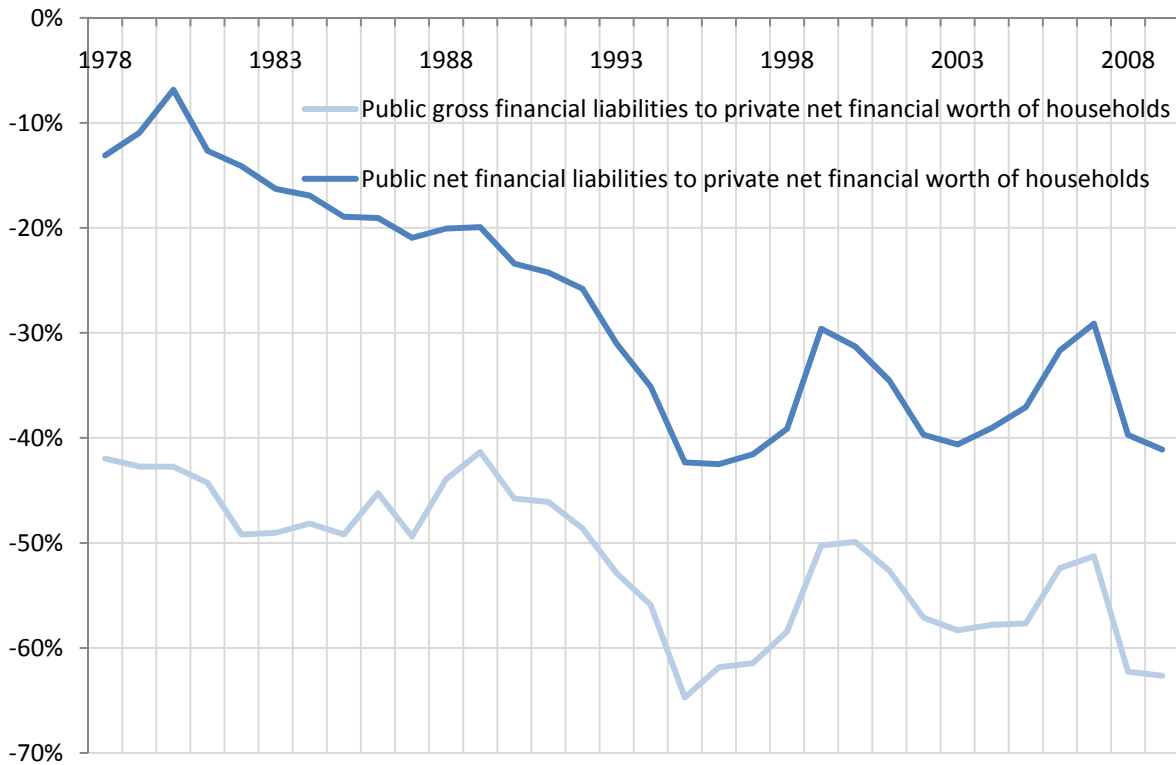
<sup>3</sup> A more flexible definition of leverage uses assets instead of net worth

**Fig.7: Public sector ratio to private and public net worth**



Source : French national wealth account, July 2010. Net worth is financial assets plus physical assets, except land property minus financial liabilities. Public is sector S13. Liabilities are negative, assets are positive.

Fig.8 represents the evolution of the same ratios but calculated using only financial assets and liabilities. The loss of information regarding physical assets changes the analysis, the overall picture remains: the ratio of public liabilities to private financial assets remains roughly stable over the last 20 years.

**Fig.8: Public sector ratio to private financial net worth**

Source : French national wealth account, July 2010. Net financial worth of households is Financial assets minus financial liabilities except long term debt. Long term debt is supposed to be covered by housing and land collateral.

#### *International comparisons of extended indicators of sustainability*

The lack of full wealth accounts for some countries leads us to concentrate first on financial accounts. However the ratios we calculate this way are much more representative of sustainability than short term indicators.

Fig. 9a&b and fig. 10a&b contrast the evolution of public gross or net liabilities (debt is displayed as negative) and households' net financial worth. Fig. 9b and fig. 10a&b reduces net worth by subtracting pension funds. The reason for that is simple: in some countries the pay as you go pension system represents a (financial) asset but is not accounted for. Removing pension funds amounts to harmonize the accounting practices.

Fig.9a: private net financial worth versus public net liabilities, %GDP

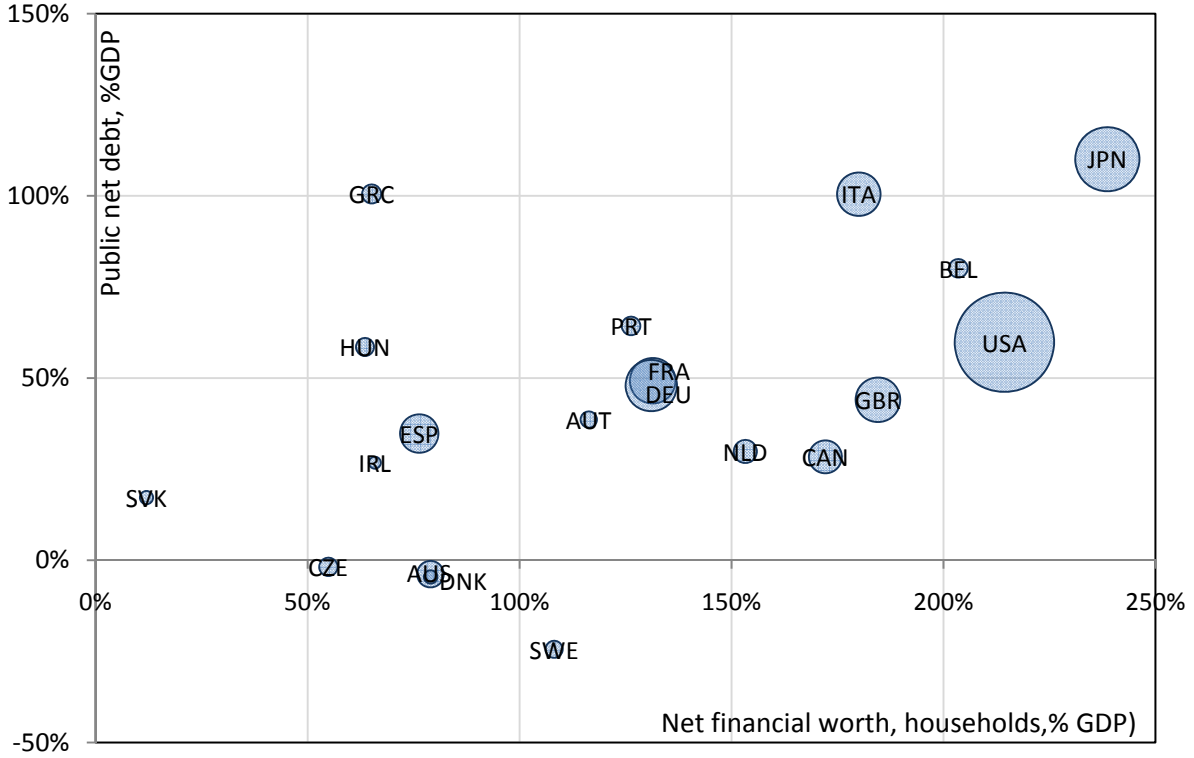
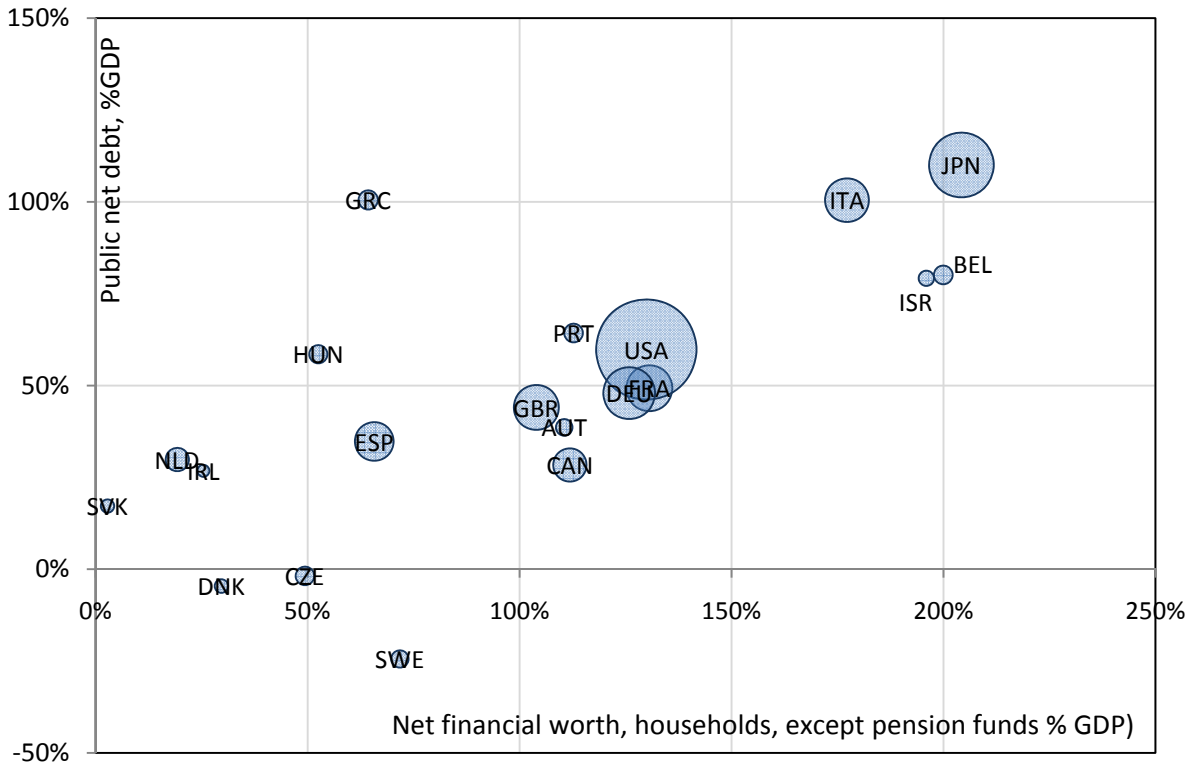


Fig.9b: private financial net worth versus public net liabilities, %GDP



Source : Financial accounts, OECD, march 2011. Surface of each circle is proportional to population. PF stands for net equity of households in pension funds.



Fig.10a: public net liabilities, %GDP versus %net financial worth

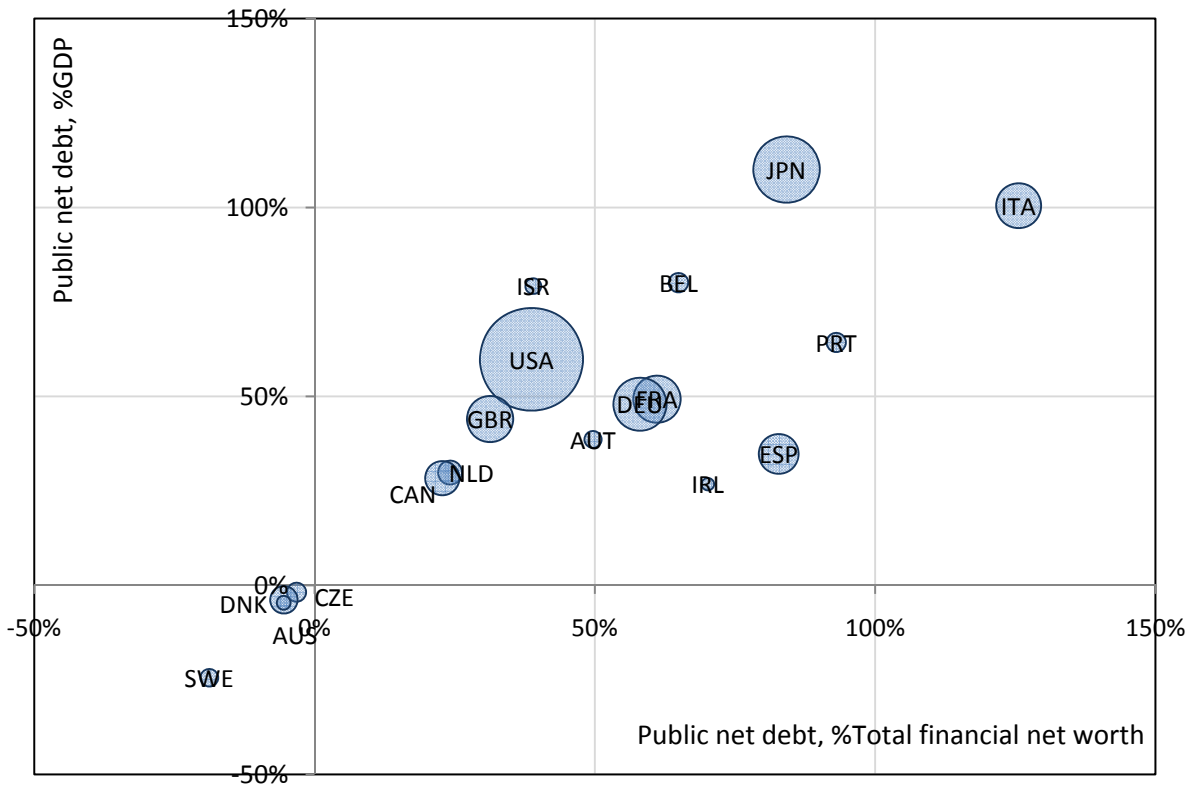
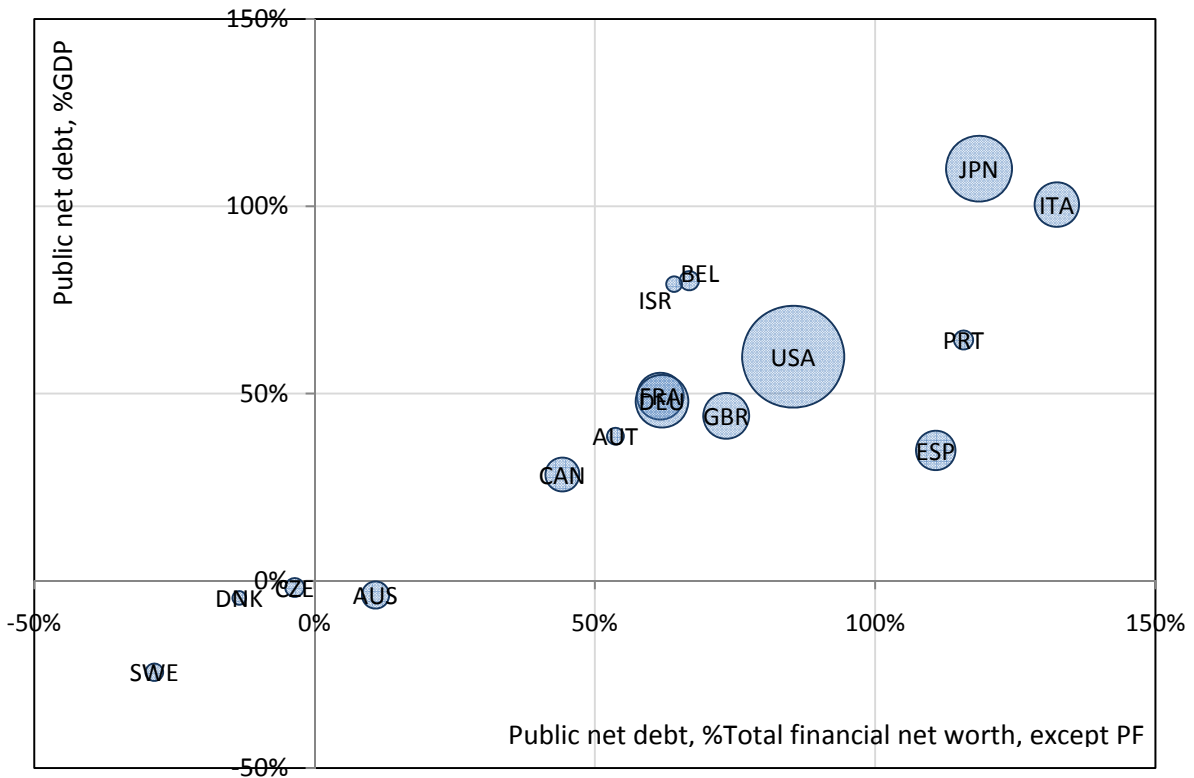


Fig.10b: public net liabilities, %GDP versus %net financial worth



Source : Financial accounts, OECD, march 2011. Surface of each circle is proportional to population. PF stands for net equity of households in pension funds.

Fig.9 and 10, with a stronger weight on fig. 10b, allow to classify countries in different groups. The first group is composed by The USA, France, Germany, the United Kingdom and Belgium. In this group the financial worth of households is rather high while public debts are around average. The second group is composed by Italy, Portugal, Spain and Japan, where households' worth is higher than in the first group, but where public debt (especially net public debt) is high as compared to net financial worth of the economy. The third group is composed by Canada, Slovakia and Austria. In those countries, public debt is lower than in first group (hence, much lower than second group) but financial worth is also lower (even negative). One can interpret these differences in the following way. Each country allocates differently its financial wealth between collective and private property, but these varying allocations do not seem to affect total financial wealth, that is the sum of public and private ones. Taking into account of physical assets would have been critical to assess further the differing social choice of countries. Netherlands, Greece, Ireland and Hungary are a fourth group. Public debt is comparable to the second group (high public debt) and household's net worth is negative. Among those countries, 3 of them are in deep financial difficulties.

Some countries, like Norway, Czech Republic, Denmark or Sweden have positive public net financial worth.

Using financial accounts, we can define what is closer to a sound long term financial sustainability indicator for the public sector; the only difference with the "short term" one is that it adds together public and private (households) net financial worth. This difference is however essential and gives its long term characteristic to the indicator. As ultimately, the burden of the debt falls on the tax payer, the indicator gives an essential information on its capacity to pay. Fig11a and b compare this indicator, as % GDP, to the usual public debt (net or gross) as % of GDP. There is a positive but weak correlation (0.3) between the two indicators, but the ranking of countries is rather different according to the criteria used.

**Table 6: Financial worth, %GDP, ranked on total net worth ex. PF**

	Total net fin. worth	Households net fin. worth	Households pension funds	Public net fin. worth (a)	Tot net fin. worth, ex. PF (b)	(a)/(b)
NOR	168	13	31	156	138	-113
ISR	203	265	72	-46	131	35
BEL	123	203	4	-80	120	67
JPN	131	213	34	-93	96	97
SWE	130	111	36	19	94	-20
FRA	81	131	1	-51	80	64
DEU	83	131	5	-49	77	63
ITA	80	194	3	-94	77	121
AUT	78	116	6	-39	72	54
USA	155	214	84	-60	70	85
CAN	124	172	60	-48	64	74
GBR	141	185	81	-44	60	73
PRT	69	126	14	-57	56	103
CZE	57	55	6	2	51	-3
DNK	84	79	49	5	34	-13
ESP	42	76	11	-34	31	109
IRL	38	66	40	-28	-2	
HUN	5	64	11	-52	-6	
NLD	123	153	134	-30	-11	
SVK	-5	12	9	-17	-14	
AUS	70	79	105	-9	-35	
GRC	-35	65	1	-101	-36	

Source : OECD Economic Outlook #89, june 2011, financial accounts, march 2011.

Greece appears to have the lowest total (private&public) net financial worth of all the countries considered. The Japanese situation looks better in terms of total net worth than in terms of public debt. Japan total net worth is close to that of Netherlands or Italy and is largely superior to Greece's one. Most countries have a total net worth between 100% and 150% of GDP. The United Kingdom appears to have a total net worth far superior to that of other developed countries.

For some countries, data allow us to go one important step further. We are able to complete financial worth by physical assets and thus build a more comprehensive balance sheet. Unfortunately, the sample is reduced and we lose some important countries like Greece. Table 7 shows data for our sample. Data is computed in constant euros, using purchase parity index in order to compare directly level of wealth per capita.

Including non financial assets changes radically the picture. Housing, land value, durable goods are included in households balance sheet, whereas infrastructures and buildings are taken in account for public sector. Netherlands ou Austria financial net worth when excluding pension funds is negative. When accounting for physical assets, both public and households, Netherlands and Austria net worth appears positive. Regarding Netherlands, we can go a little further since we can account for land value (buildings are in non

financial non land assets, priced at construction cost net of depreciation). Excluding pension funds and land value, Netherland net worth is of 23,500 euros per capita.

Judgment on other negative financial net worth, such as Greece, is yet to be confirmed including, when available, non financial assets.

**Table 7: Financial and non financial net worth, 2009**

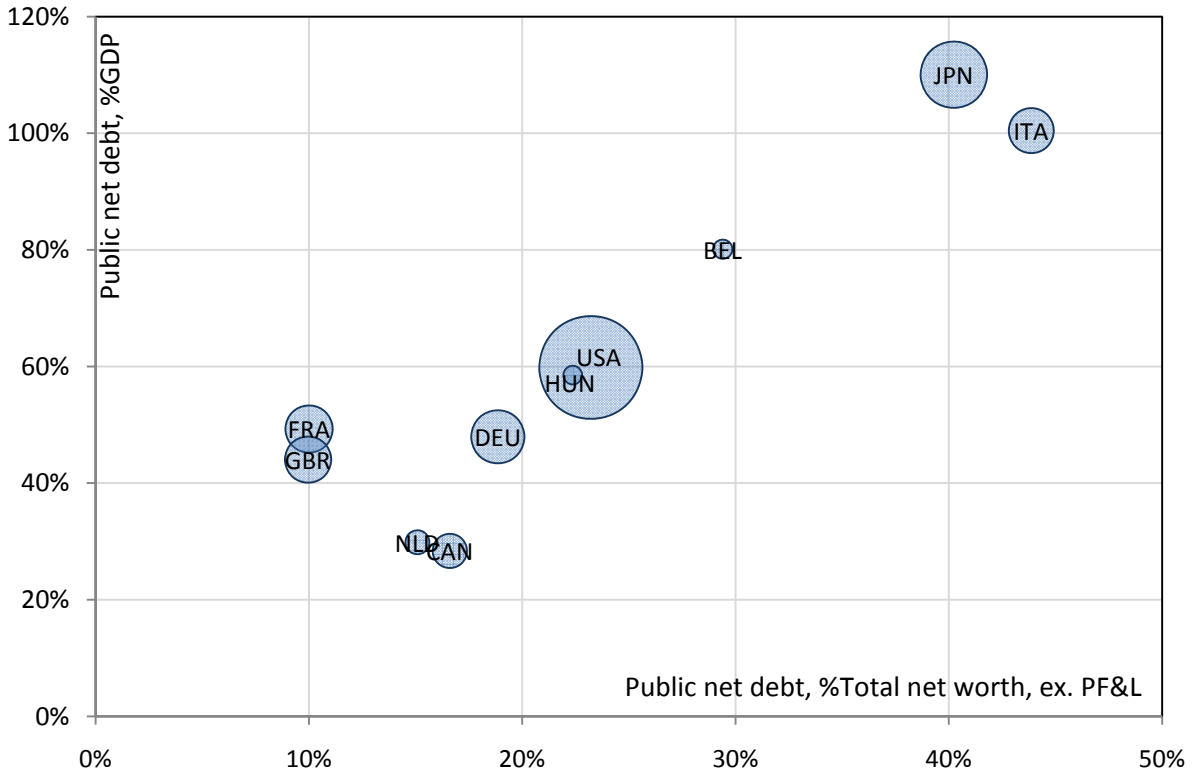
<i>k€2009</i>	<b>AUS</b>	<b>GBR</b>	<b>FRA</b>	<b>USA</b>	<b>NLD</b>	<b>CAN</b>	<b>BEL</b>
Total net worth, per capital, ppp	174.4	161.5	150.2	138.5	119.2	115.7	88.2
Household net worth	141.8	159.9	143.8	136.8	107.5	119.4	101.9
Financial net worth	26.8	57.1	38.9	86.8	55.0	57.3	65.0
of which pension funds	35.6	24.9	0.2	34.2	48.1	20.0	1.1
Non financial assets	115.0	102.8	104.9	50.0	52.4	62.2	36.9
Land			49.3	13.0	47.6	28.7	
Non fin. non land assets		55.7	37.0	4.9	33.4		
Public net worth	32.7	1.7	6.5	1.8	11.7	-3.8	-13.7
Financial net worth	-3.1	-13.6	-15.0	-24.2	-10.7	-15.9	-25.6
Non financial assets	35.7	15.3	21.5	26.0	22.4	12.1	11.9
Land			7.4		3.5	3.2	
Non fin. non land assets		14.1		19.0	8.9		
Total net worth, ex. PF	138.9	136.6	150.0	104.3	71.1	95.6	87.0
<i>%GDP</i>							
	<b>AUS</b>	<b>GBR</b>	<b>FRA</b>	<b>USA</b>	<b>NLD</b>	<b>CAN</b>	<b>BEL</b>
Total net worth	515	522	508	342	332	348	276
Total net worth, ex PF	410	442	507	258	198	287	273

<i>k€2009</i>	<b>DEU</b>	<b>ISR</b>	<b>JPN</b>	<b>SWE</b>	<b>ITA</b>	<b>CZE</b>	<b>HUN</b>
Total net worth, per capital, ppp	83.9	78.5	76.0	66.1	65.5	62.6	43.6
Household net worth	86.4	80.4	74.9	59.5	92.9	34.1	33.7
Financial net worth	41.9	57.5	60.6	38.2	58.8	11.7	11.3
of which pension funds	1.7	15.7	9.8	12.5	0.8	1.2	2.0
Non financial assets	44.6	23.0	14.2	21.3	34.0	22.3	22.4
Land			44.8				
Non fin. non land assets		-30.6					
Public net worth	-2.6	-1.9	1.2	6.6	-27.4	28.6	10.0
Financial net worth	-15.5	-10.0	-26.6	6.5	-28.3	0.4	-9.3
Non financial assets	13.0	8.1	27.8	0.1	0.9	28.2	19.3
Land			7.5				
Non fin. non land assets		20.3					
Total net worth, ex. PF	82.2	62.9	66.2	53.6	64.6	61.5	41.7
<i>%GDP</i>							
	<b>DEU</b>	<b>ISR</b>	<b>JPN</b>	<b>SWE</b>	<b>ITA</b>	<b>CZE</b>	<b>HUN</b>
Total net worth	263	362	266	192	216	293	245
Total net worth, ex PF	257	290	232	156	214	288	234

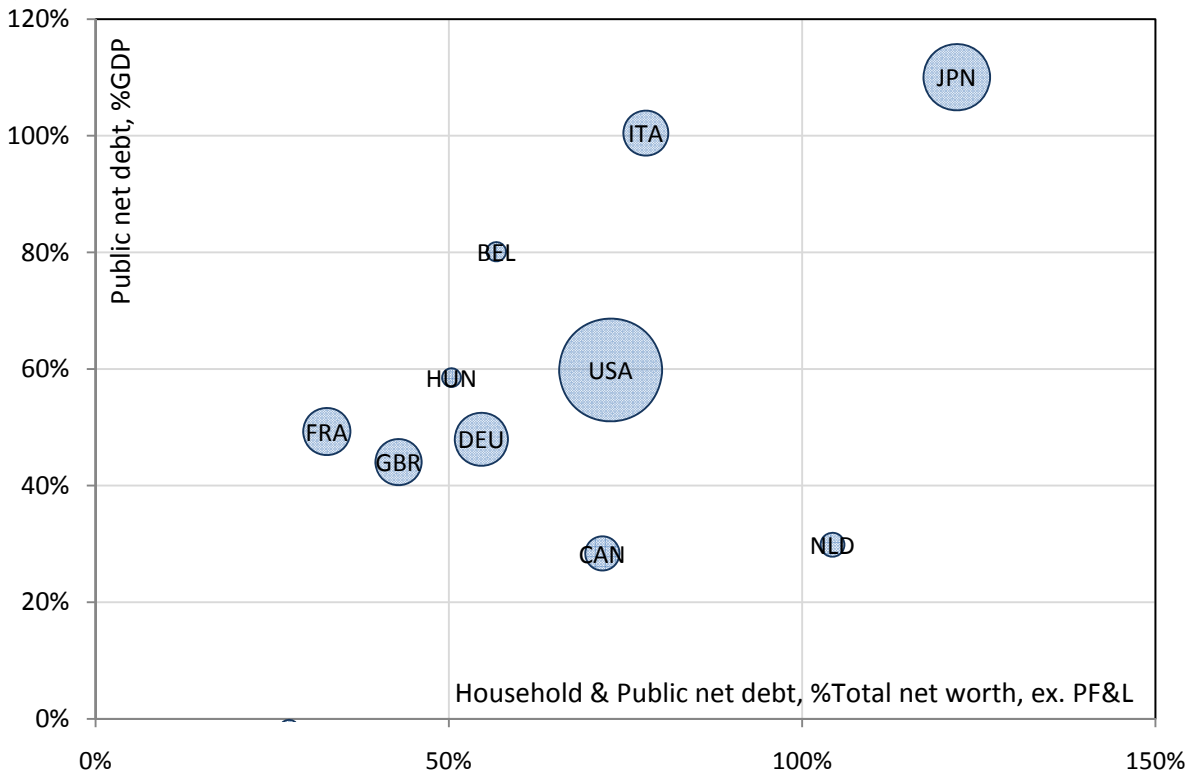
Source : OECD Economic Outlook #89, june 2011, financial accounts, non financial balance sheet, march 2011.

This more comprehensive view of wealth allows us to build a more satisfactory sustainability indicator, dividing public debt by net worth, excluding pension funds. This is presented on fig. 11a.

**Fig.11a: public net debt to total net worth (fin.&non fin.) versus public net liabilities, %GDP, 2009**



**Fig.11b: total debt to total net worth (fin.&non fin.) versus public net liabilities, %GDP**



Source : OECD Economic Outlook #89, June 2011, financial accounts, non financial balance sheet, March 2011. Surface of each circle is proportional to population. PF&L stands for net equity of households in pension funds and land value.

Correlation with public debt to GDP ratio is high, but this is due to the fact that the sample is reduced. Being able to publish non financial and financial wealth accounts seems to be a condition to sustainability. Of all countries in this reduced sample, the ratio of debt to net worth is less than 50%, average being close to 20%.

Nevertheless, differences between the two indicators are striking. France and Germany for instance have the same (net public) debt to GDP ratio, but France has much more wealth per capita than Germany.

Fig. 11b presents a broader view on debt. Here public and households debt is summed up and divided by net worth, excluding pension funds and land value. Removing land from balance sheet is justified to take account of the possibility of a fall in land prices, following the burst of a housing bubble. Link with public debt to GDP is weaker than with previous indicator.

Fig.12 shows the evolution of long term financial sustainability ratios. Fig. 12a displays evolution of total financial net worth, per capita and in constant euros. A group of seven countries (Germany, Austria, Denmark, Sweden, Israel, Norway) have increased their total net worth over the last 10 years. The last year known for financial accounts being 2009 the data does not show fully the impact of crisis. For Japan, USA and Netherland net worth has decreased but is still high in 2009. Greek situation has been strongly deteriorated, losing more than 20,000 euros per capita in constant terms over the last 10 years.

Fig 12a relies on more sophisticated financial and non financial accounts. Over a 10 years period, most countries have increased their wealth per capita. For some countries (France, Netherland, USA, Japan and Canada), we are able to correct form land increase, thus discarding for housing bubble. The correction is without matter for some countries (like USA), because the bubble has bursted and land value has not really increased over the last 10 years. However, for France land per capita value was 15,000 euros in 1999 and was close to 50,000 euros in 2009.

Fig. 13a&b complete our preliminary exploration of sustainability. Total (households and public) debt as a share of total net worth is plotted against evolution of net worth over the last 10 years. Although we did not search any causal model of sustainability, fig. 13 suggest a correlation (0.6) between long term sustainability indicator and evolution of total wealth per capita. Such a correlation does not exist with public debt divided by GDP.

Fig.12a: Evolution of total net financial worth 1999-2009

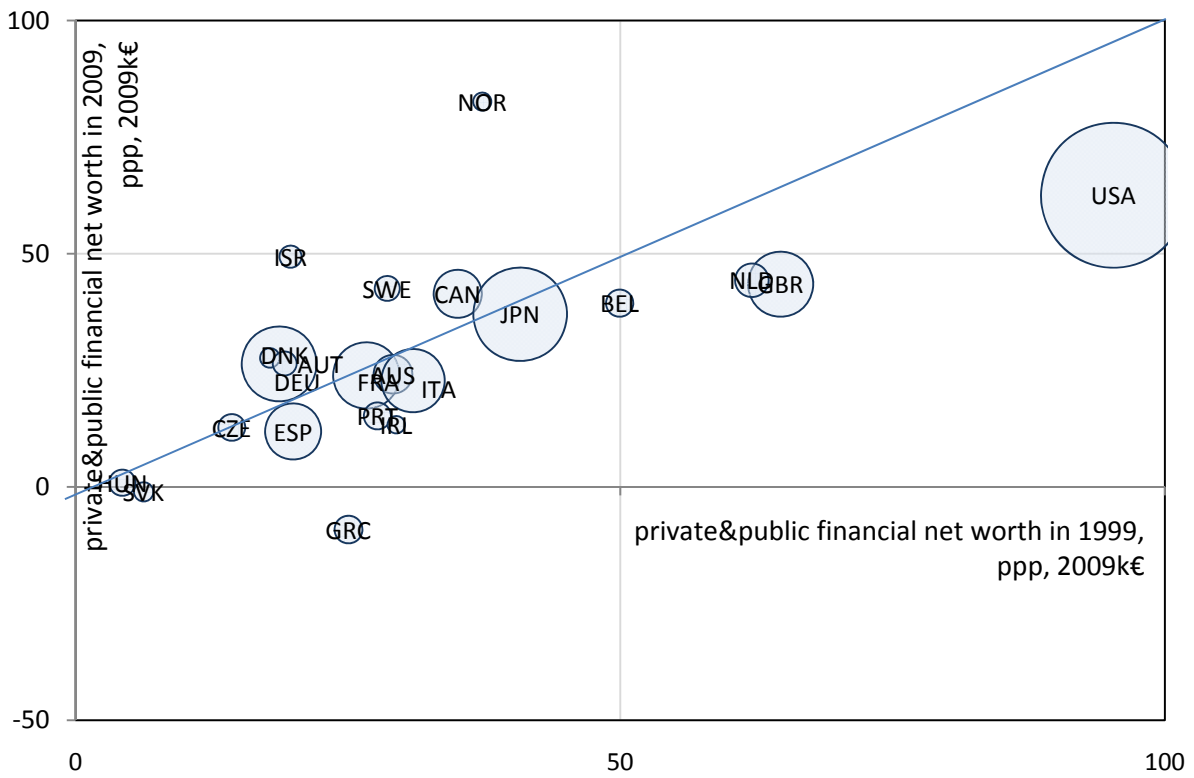
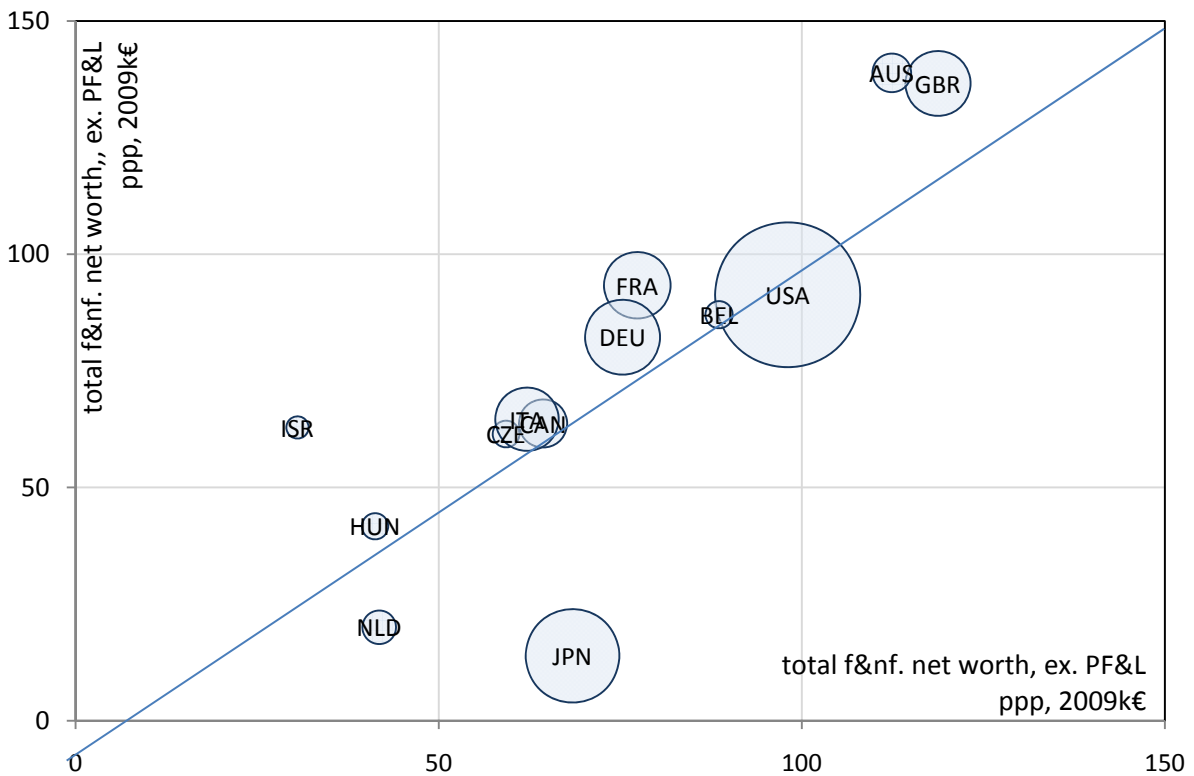


Fig.12b: Evolution of private&public net worth ((fin.&non fin.) 1999-2009



Source : Financial accounts, OECD, march 2010. Surface of each circle is proportional to population. Net financial worth is without pension funds. Total stand for households and public sector.

Fig.13a: Evolution of total net financial and non financial net worth versus total debt as % net worth

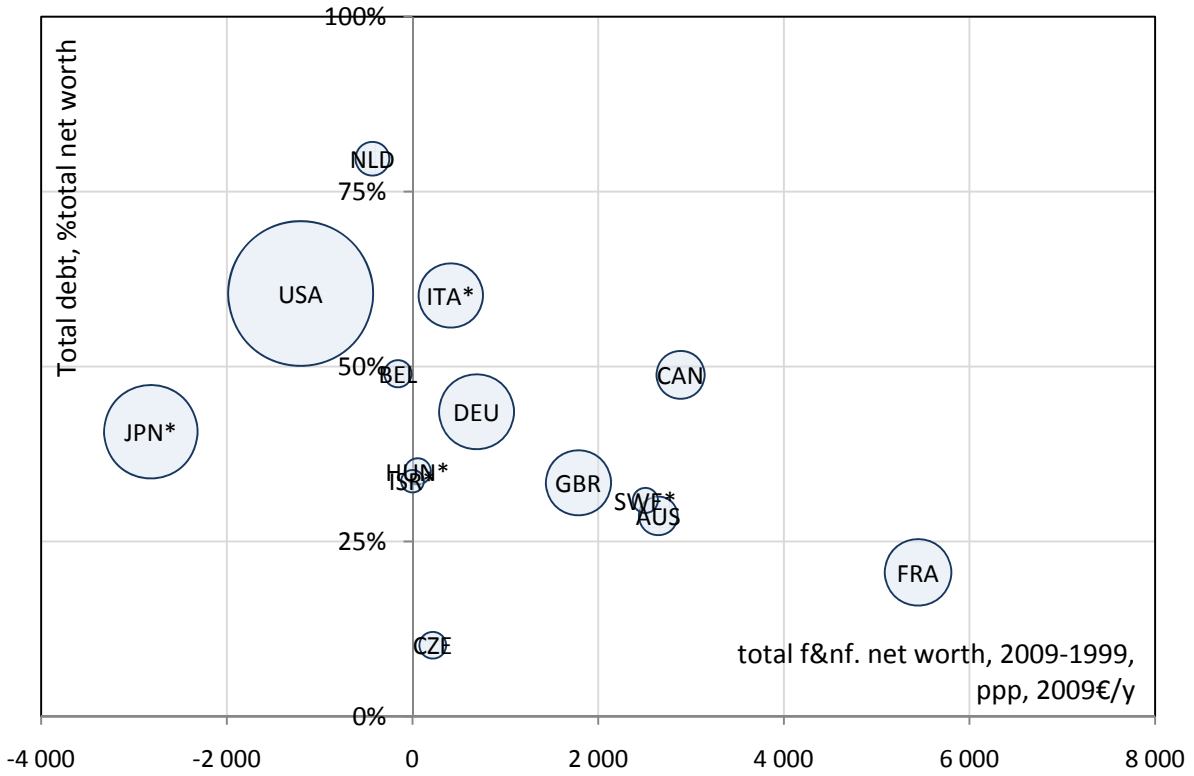


Fig.13b: Evolution of total net financial and non financial net worth versus total debt as %GDP

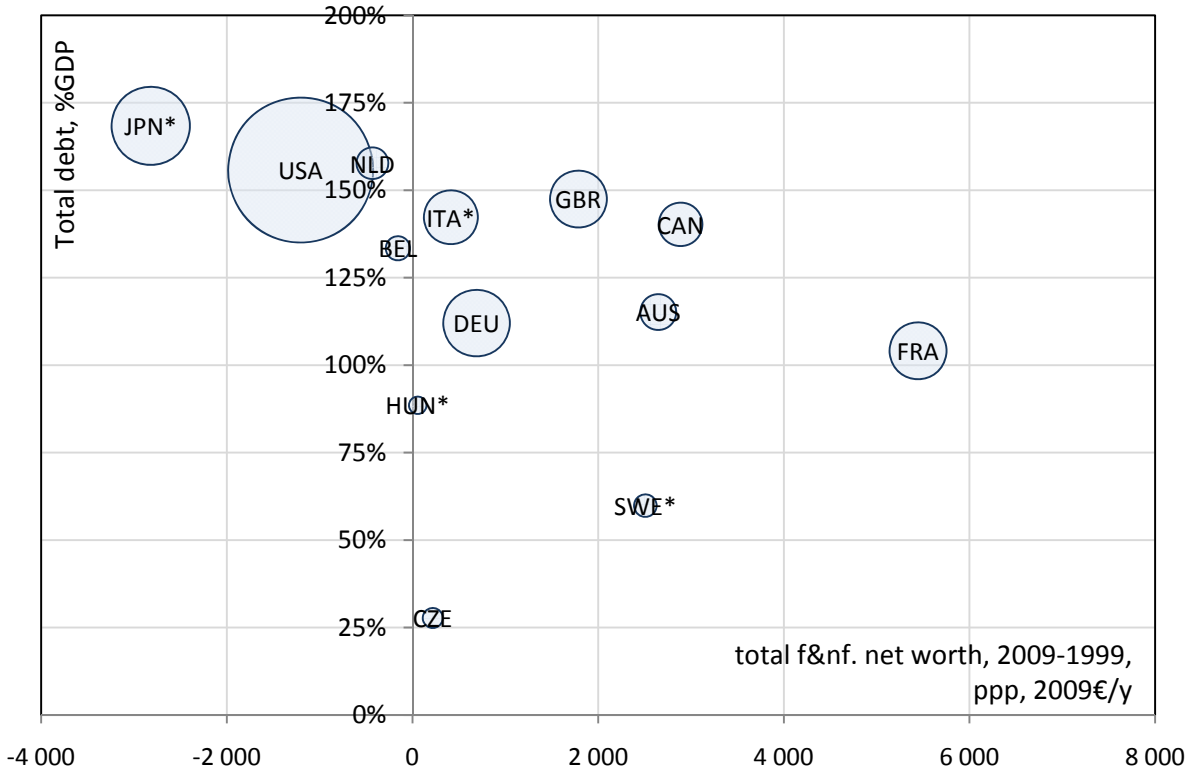
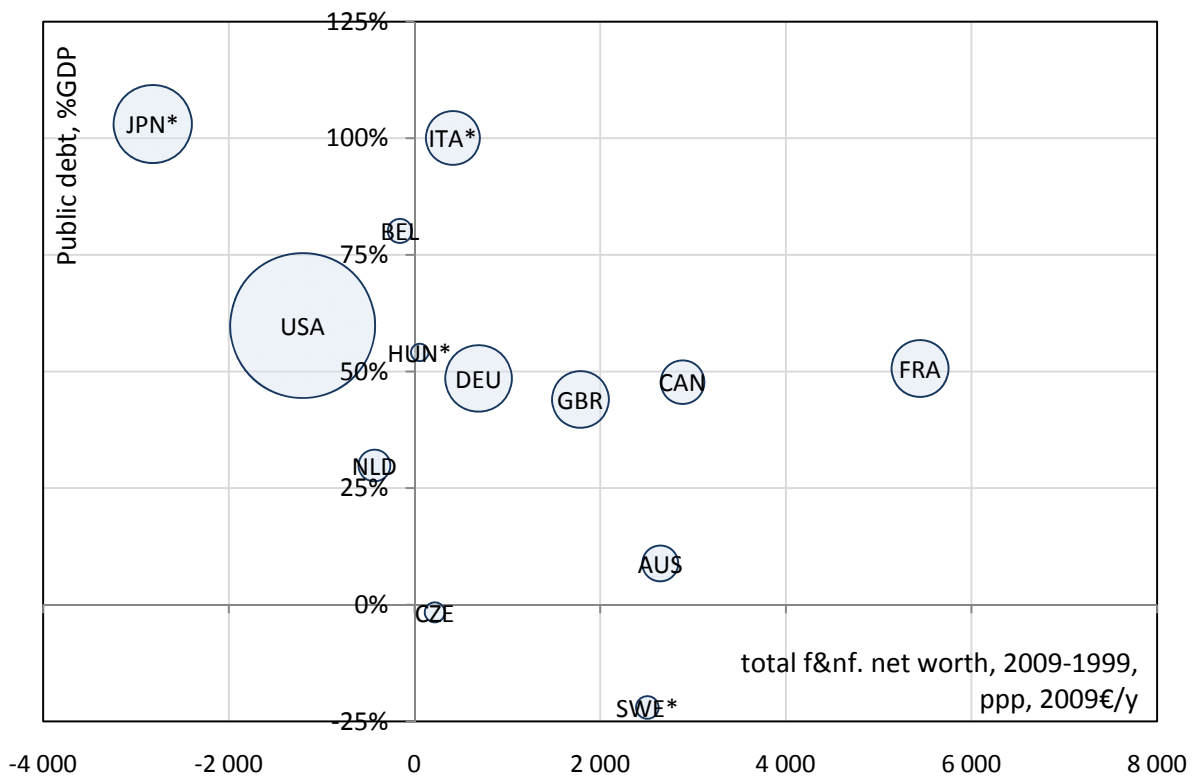


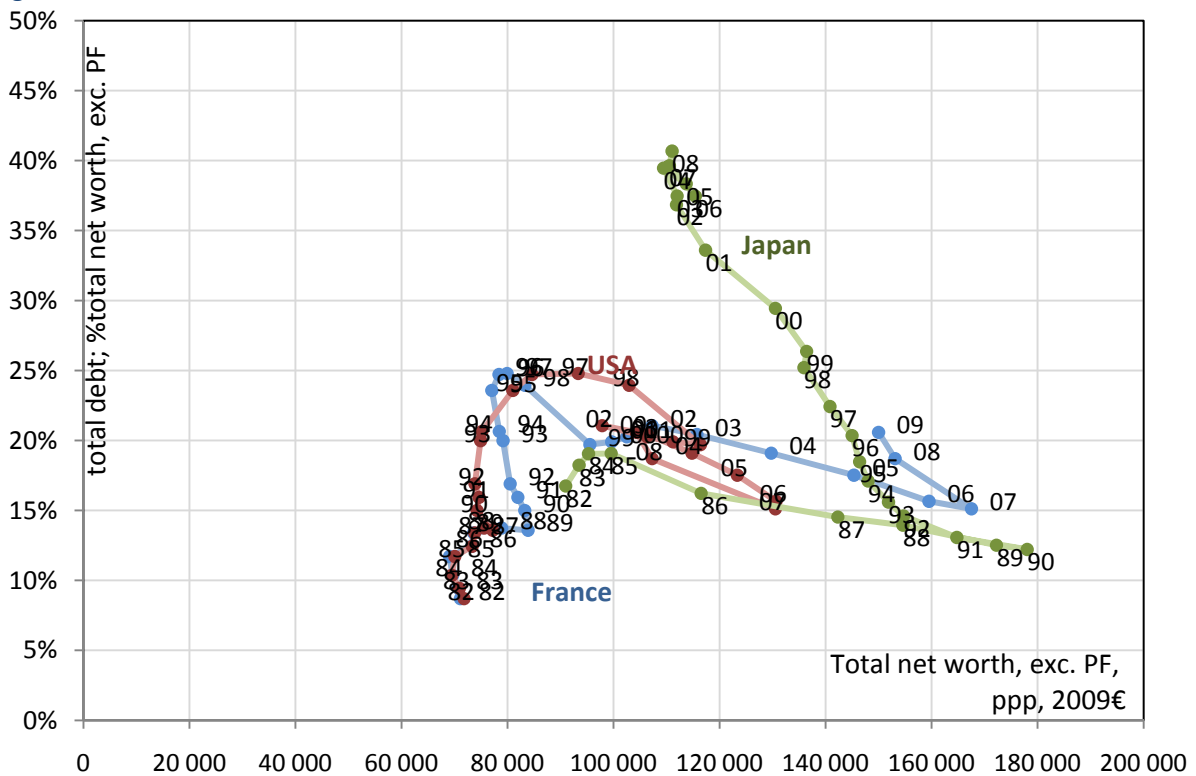


Fig.13c: Evolution of total net financial and non financial net worth versus public debt as %GDP



Source : Financial accounts, OECD, march 2010. Surface of each circle is proportional to population. Net financial worth is without pension funds. Total stand for households and public sector

**Fig.14: Evolution of total net financial and non financial net worth and total debt as % total worth**



Source : Financial accounts, OECD, march 2010. Surface of each circle is proportional to population. Net financial worth is without pension funds. Total stand for households and public sector

#### **IV. REFERENCES**

to be included.