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A revenue package for the European Union

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Abstract

"In order to pull their economies out of recession, European governments had to massively increase public spending, in addition to the budgetary impact of automatic stabilisers. Instead of compensating this spending with excessive austerity, necessary fiscal consolidation should be partly achieved via a European-wide budget revenue package. This should include new progress in tax coordination (including a common corporate tax base), a European (and preferably global) financial transactions tax, a common and effective European strategy against tax fraud with annual national targets, an EU-led initiative at global level (G20 and OECD) to step up the fight against tax havens within a clear timeframe, and an EU-wide CO2 tax. Such a package should also help to shift some of the tax burden on labour to other sources."

We study in this paper the possible effects of such a European-wide revenue package. One solution to improve fiscal sustainability without threatening economic recovery would be to transfer part of national debts to the European level. In order to reimburse the debt, new financial resources may be found at the European level. It may be part of a revenue package including a financial transaction tax, improvement of tax coordination, fight against fiscal fraud and evasion and a european-wide carbon tax. By reviewing the literature on effects of each individual measure, we show that it can yield significant revenues that can be used for different purposes. It may help European Union to run countracyclical policies and avoid excessive austerity that may have adverse effects on growth and employment.

We argue that all this potential revenues should not be dedicated only to fiscal consolidation. A European budget and improvement in fiscal federalism may be profitable the European economy in order also to run contra-cyclical policies. Moreover if a European-wide carbon tax is judicious, revenues created by such a tax should not be use to reimburse public debts but to make redistributional policies in order to offset the regressive effects of such a tax. Finally, if a financial transaction tax can yield lots of additional revenue, part of these revenues may be used for other purposes such as the financing of global public goods or international development.

Key-words: European Union, Financial Crisis, Fiscal policy, Carbon tax, Financial transaction tax, tax evasion

1. Introduction

The current financial and economic crisis has strong consequences for governments. They first had to massively bail-out their banks in order to avoid a collapse of the financial and banking system. Central banks also reacted strongly using traditional and non-traditional tools. Once the situation of the banking system was stabilized, governments also needed to face the huge economic crisis and most countries faced recession. Massive public deficits followed, as a conjunction of an increase of public spending, discretionary fiscal measures and the effect of automatic stabilizers. This huge increase of public deficit brought the issue of fiscal sustainability. The sovereign bonds spread in Greece have exploded and the cost of borrowing for the Greek state rapidly became unsustainable. The European Union finally agreed in May on a rescue plan of 110 billions of euros for three years. Over the same period, Greece had to accept a plan of deficit's reduction of 30 billions of euros. Member states also agreed on the setting up of the European Financial Stability Facility that will be able to make loans up to a maximum of 440 billions of euros that can be combined by e60 billions coming from the European Financial Stabilisation Mechanism and up to e250 billions from the IMF, in order to help member states facing sovereign debt crisis. The fear of a contagion of the sovereign debt crisis to other European countries is still persistent and rating agencies often threat to downgrade the credit rating of government bonds for several countries. In order to avoid this downgrading, Greece, Spain and Portugal adopted fiscal austerity programs, while Italy, France or Germany announced or set out plans for 2011 and beyond. However, lots of economists considered that austerity program came too early and may become counter-productive. As noticed by Krugman (2010), "Skeptics pointed out that slashing spending in a depressed economy does little to improve long-run budget prospects, and may actually make them worse by depressing economic growth". Governments are facing indeed a curious dilemma. In order to foster economic recovery, they should not anticipate the exit of the crisis by excessive austerity programs. But at the same time, they have to take into consideration a possible increase of the cost of borrowing and even a risk of fiscal unsustainability with the rise of interest rates. In order to overcome this problem, Piketty (2010) proposed to transfer the share of the national debts induced by the current financial crisis to the European Union and to create a European Bonds Agency in order to reduce collectively the cost of borrowing. However, a European Bonds Agency imply to increase own resources

of the European Union. Even without this European bounds agency, an increased federal budget may be useful in future crisis prevention and management. In this paper, we investigate the possible impact of a EU-wide revenue package including different fiscal measures to be taken a the EU level. We show that a significant part of the excess debt burden explained by the crisis can be covered by additional revenues at the EU level. It implies more solidarity among member states.

2. The budgetary impact of the financial crisis

2.1 The fiscal impact

In order to estimate the fiscal impact of the current crisis, we should take into consideration several channels. First, States had to inject money in order to guarantee public deposits, to borrow to the banks, or to enter their capital. The second channel is the automatic stabilizer. Due to the financial crisis, social spending and unemployment benefits increased while the revenue generated by taxes fell due to a lower economic growth. The third channel is the budgetary and fiscal stimulus. In order to support the aggregate demand, most governments increased their spending in order to finance public investments or to subsidy consumption. Some governments also lower their level of taxes, especially for small and medium enterprises in order to reduce the number of bankrupts. These three channels had a huge impact on the budgetary situation of most developed countries, in terms of deficit and debt. According to the IMF (2010a), the general gross debt ratio in advanced economies increased by 19,1 percentage points since the beginning of the crisis and is likely to increase again by 20 percentage points until 2015. The average gross debt in these countries would be then about 110%. About a half is explained by revenue loss and 21% by an unfavorable interest rate-growth differential during that period. Almost two-third of the overall increase of public debt is then explained by the fall in GDP in 2008 and 2009. In comparison, fiscal stimulus accounted for only 11,5% of the overall debt increase and public support to the financial sector by around 8,5%. The net direct cost of the support to the financial sector, taking into account the asset recovery through end-2009, is estimated at a level of 2,7% of the GDP for advanced economies within the G20, which represent 827 billions of US$. However, we

should notice that within Europe, the cost is very heterogeneous, ranging from 0,3% of GDP in France or Italy to 4,8% in Germany and 5,4% in the United Kingdom.

The burden of the debt should not be seen as an economic problem if the future economic recovery allows governments to reduce their deficit and thus their overall gross financing needs[2] and if interest rates are maintained at a low level. The fear comes from the increase of the government bonds spread if financial markets consider national fiscal situation as unsustainable.

The relative asset swap spread, which measures the difference between benchmark government bond yields and the fixed-rate arm of an interest rate swap in the same currency and of the same maturity (usually 10 years) as the bond, increased a lot in Greece, Portugal, Ireland and in a lower extent in Spain. This induced an increased cost of borrowing for governments in these countries. The risk of default could affect the stability of financial sector which can have adverse effects in other countries. However, this risk is low for most European countries, which have a spread closed to zero. And in the recent weeks, we observed an increased demand for public bonds which had the positive effect to lower the cost of borrowing for these countries. As stated by Fitoussi and Stiglitz (2009), "The fear of an unsustainable increase in public debt and the concern about inflation to which it leads are in present circumstances much exaggerated".

According to the IMF, if governments want to lower the gross-general government debt to GDP ratio back to 60% (the pre-crisis median in advanced countries) by 2030, they have to improve the cyclically adjusted primary balance by around 8.7 percentage points (6,6 percentage points in the EU), from a 4.9% deficit in 2010 to a surplus of 3.8% in 2020. We observe large differences between countries with more efforts needed for countries which al-

2 One could argue that public debt has an adverse effect on economic growth because of higher long-term interest rates (Gale and Orszag, 2003), higher future level of taxation (Barro, 1979) or inflation (Sargent and Wallace, 1981). However, the empirical observations are weak and very controversial. Reinhart and Rogoff (2010) found a negative growth rate differential for highly endebted countries. Kumar and Woo (2010) found that an average increase of 10 percentage points in the initial debt-GDP ratio is associated with a slow-down in annual per-capita GDP growth of around 0.2 percentages points. Imbs and Rancière (2008) found a non-linear effect of external debt on growth with an insignificant effect below a certain level of debt and Cordella, Ricci, and Ruiz-Arranz (2010) found a non-significant effect for very low and very high level of debt.

ready had a high level of debts before the crisis but also for countries most affected by the crisis. In absolute values, giving the value of GDP of 2010 as a reference, the amounts needed are very important. At the European level, it represents e750 billions (see table 1 for more details). The European Commission (2010b) calculates the fiscal consolidation needs using the sustainability gap, which is estimated to be 6.5% of GDP on the EU average. If countries want to reach a debt-to-GDP ratio of 60% by 2020, they would need to have a structural primary balance of 4,5% of GDP in the period 2011-2015, which corresponds to a budgetary effort of 8,75% of percentage points of GDP over the period.

2.2 The dangers of an excessive austerity

Even if the gross debt-to-GDP target is higher to 60% the fiscal cost of such an adjustment would be very important for the European economies and may have adverse effects if it depresses the aggregate demand. The European Commission already asked to 19 countries to tighten their fiscal policy already in 2009 with a total effort of more than 3,5% of total GDP from 2010-2014. In July 2010, four more countries were concerned by these *"excessive deficit procedures"*. In June, the European Commission (2010a) declared *"effective actions were taken"* and that governements *"have acted in accordance with the recommendations"*. The commission considered that *"All recommendations were framed in a medium-term framework due to the existence of exceptional economic circumstances and also in view of the sheer size of the consolidation needs."* However, several studies[3] showed that this fiscal exit strategy would have a depressive effect on the economic growth of these countries.[4]

3 See for instance Bibow (2004), Romer and Romer (2010), Stiglitz (2010) or Krugman (2009).

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Table 1: Needed Fiscal Adjustment according to the IMF (2010a)

Country	Required Adjustment between 2010 and 2020 (in % of GDP)	Required Adjustment between 2010 and 2020 In millions € (2010)
Austria	4,7	13142
Belgium	4,7	16409
Czech Republic	3,7	5393
Denmark	4,3	9840
Estonia	-0,1	-14
Finland	4,4	7750
France	8,3	161565
Germany	4	97295
Greece	9,2	21823
Hungary	-1,3	-1257
Ireland	9,8	15610
Italy	4,1	63687
Latvia	8,8	1469
Lithuania	8	2077
Luxembourg	.	.
Malta	.	.
Netherlands	5,5	32192
Poland	7,2	25330
Portugal	7,8	13283
Romania	2,1	2591
Slovak Republic	4,1	2701
Slovenia	4	1432
Spain	9,4	98961
Sweden	2,3	7748
UK	9	153323
TOTAL EU 25	**6,22**	**752352**

Source: IMF (2010a) for Required fiscal Adjustment, Eurostat (GDP) and author calculations. Data on required fiscal adjustment are missing for Luxembourg and Malta. Calculations are based on gross debt levels. The required adjusment is the adjusment of the cyclically adjusted primary balance needed to bring the debt ratio to 60% in 2030 or to stabilize debt at the end 2012 level by 2030 if the debt-to-GDP ratio is less than 60%. The cyclically adjusted primary balance is assumed to improve gradually from 2011 until 2020 and maintained constant until 2030.

The difference between the approach of the European Commission and the one of the IMF is that the latter one considers that the fiscal tightening should me more gradual while the European commission considers it should start already this year. Hansen (2010) studied the effect of the fiscal tightening as proposed by the European Commission, comparing the forecast with the basic scenario without fiscal tightening. According to these estimations, the GDP growth will be on average reduced by 0.7%. Unemployment, instead of stagnating, will continue to rise until 2015. These estimations do not take into account the possible negative effect of fiscal tightening on consumer and investor confidence. In this case, effects will be even worse. These estimates are also based on the hypothesis that the European Central Bank will also react by lowering the interest rate. Again, if it is not the case, effects will be

worse. This negative impact is largely influenced by the strong negative spillovers of a fiscal tightening at the EU level.

2.3 A EU budget to face national budgetary difficulties

We start with a simple observation. While the US faces serious state-level fiscal crises, we focused in the last month on the fiscal situation of European countries, as a consequence of the Greek solvency problem, fear of contagion and institutional deficiencies. A higher level of fiscal federalism may have solved some of the problems raised by the Greek crisis. Darvars (2010) compared the general feature of the EU and US fiscal system and showed how a more integrated federal system would help crisis prevention and management in the European Union. In particular, he argued that it would have increased the political coherence of the euro area. Also, it would have given scope for greater redistribution, risk sharing and a federal countercyclical policy that can counter-balanced the depressive effects of consolidation policies at the national level.

In fact a higher federal budget may be considered for distinct scenarios. As stated by Darvars (2010), one can consider that national states may focus on consolidation policies, and the European Union can offset the negative spillover on growth and employment by a federal expansionist policy. If the national states have to bear a higher spread on national bonds, this policy may be beneficial at the European level.

The other idea is the one proposed by Piketty (2010). In order to avoid the negative spillovers induced by a fiscal tightening at the national level, he proposed to transfer to the European Union the burden of the national debts induced by the current crisis. A European Bond Agency will be responsible of the debt, benefiting from a lower cost of borrowing. In this case, and to avoid future excessive austerity programs at the National level, the European Union will need to find new resources to reimburse these loans

Thus, the general idea of a revenue package for the European Union can be a way to build up these new resources, allowing an increase of the federal budget of the European Union. We will investigate the possible effects of four main measures: (1) a financial transactions tax,

(2) a European-wide Carbon Tax, (3) more efforts in tax coordination, (4) a fight against tax fraud and tax heaven.

3. A EU financial transactions tax (FTT)

The idea of a financial transactions tax is far to be new and can take various forms. Keynes (1936) already proposed a tax on transactions on stocks markets. Tobin (1978) proposed a currency transaction tax, in order to put sands in the wheel of international finance. Here, the goal was not to raise public revenue as such but to slow down short-term speculation by increasing its cost. The debate was relauched in the 90's following the growing instability of financial markets. As noticed by Schulmeister (2009), there are different advantages to consider the possibility of a general financial transaction tax instead of a tax on a specific financial market. The main one is the tax base is broader, allowing to set a very low tax rate with a possible high level of revenue. There are two kind of arguments in favor of such a tax: the first one is the minimization of the excessive volatility of financial markets which could have a destabilizing effect both in the short and in the long run. The second one is the considerable revenues such a tax can provide, that could finance fiscal consolidation or other political goals (especially at the international level). Also as the current crisis came from financial markets, there is a common will to increase the public contribution of banks and other financial players. The opponents of such a tax based their arguments on the supposed efficiency of financial markets, on the increased needs of liquidity to smooth the movements of asset prices towards their fundamental equilibrium. However, Schulmeister, Schratzenstaller, and Picek (2008) argued that strong and persistent deviations of asset prices from their fundamental equilibrium are rather the rules than the exception, due to an excessive volatility of prices.

3.1 Possible revenue of a FTT: the Schulmeister, Schratzenstaller, and Picek (2008) study

The most extensive study of the possible revenues generated by such a tax is certainly the one of Schulmeister, Schratzenstaller, and Picek (2008). They estimate the influence of a general financial transactions tax for three tax rates: 0.1%, 0.05% and 0.01%. The estimates

take into account the reduction of transactions volume which will depend on the tax rate[5], the pre-tax transaction costs and the leverage in the case of derivatives instruments. They also propose to put in place such a tax in a gradual way. The first step could be the implementation a FTT only on spot and derivatives transactions on organized markets in some countries. As 99% of these transactions in the EU are concentrated in the UK and in Germany, the authors consider the first step could be a FTT on these markets in these two countries. The second stage will be then a FTT on all transactions within the Euro area which involve no other currencies and the third stage, a FTT including all spot and derivatives transactions in the foreign exchange market.

The authors also noticed that the revenue generated by a FTT is globally equivalent to the hypothetical revenues from a VAT on financial services. The main difference is the distinction made between different financial activities. A FTT would have very small effects on financing, insurance and risk transformation activities while activities of short-term trading would be very affected.

5 They propose different scenarios concerning the trading reduction volume: high, medium and low. Also, they take into account the large difference of the transaction costs between "traditional" spot markets and "modern" derivatives markets, the latter ones facing much lower transaction costs.

Table 2: Hypothetical revenue of a FTT in Europe in % of nominal GDP

Reduction in transaction volumes / Tax rate	0.1%	0.05%	0.01%
Spot transactions on exchanges			
Low	0.240	0.123	0.025
Medium	0.229	0.120	0.025
High	0.217	0.116	0.024
Derivatives transactions on exchanges			
Low	1.384	0.915	0.362
Medium	0.937	0.692	0.317
High	0.490	0.368	0.272
OTC transactions			
Low	1.636	1.091	0.436
Medium	1.091	0.818	0.382
High	0.545	0.409	0.327
All transactions			
Low	3.260	2.129	0.823
Medium	2.257	1.630	0.724
High	1.253	0.893	0.624

Source: Schulmeister, Schratzenstaller, and Picek (2008)

The revenues would largely differ by countries, from 0.240% of GDP for Italy to 6.352% for the UK (assuming a tax rate of 0.05% and a medium reduction in transaction exchange). This can be a problem in the setting-up of the tax. Richter (2006) argued for example that most of the revenue will be created in the UK (for 3/4) and in Germany (for 1/4) and therefore cannot be use to finance the EU budget because it will violate the principle of "fair sharing of burdens across Member States". Schulmeister, Schratzenstaller, and Picek (2008) opposed to this argument that the tax will be effectively paid by all actors trading in the UK and in Germany: *"if we assume that trading activities are roughly proportionate to the overall economic performance (i.e., nominal GDP) then an FTT might well be in line with the principle of a fair sharing of the tax burden"*. They nevertheless considered it would be logical to give to the UK and to Germany a substantial fixed share of tax revenues.

If we retain a tax rate of 0.05% and using the GDP of 2009 (Source: Eurostat), a uniform tax on all financial transactions would levy between €105.3 and 251 billions if implemented in all 27 European countries (€191 billions in the medium case), depending on the reduction in transactions volume. A tax that would be applied only in the euro area would not have so much effects as much of the tax revenue comes from the UK.

3.2 Other estimates

Kapoor (2010) finds a relatively similar estimate of the revenues generated by a FTT, retaining a range of €150 - 250 billions. He keeps the same hypothesis, considering the possibility of a FTT on all financial transactions.

In fact, the effects of such a tax will depend on the capacity to tax different types of financial transactions. In particular, the possibility to tax OTC transactions or derivatives transactions is controversial. Schulmeister (2010) considers it is highly feasible. Concerning derivatives exchanges (which represents 90% of all transactions), commissions are paid through electronic settlement system. A FTT may be collected through the same system. It may be more complicated concerning OTC transactions as it is a trade of financial instruments directly between two parties. Schulmeister (2010) considers it is possible to tax such operations through electronic settlement and information systems. According to his estimation, **a tax that will be implemented only on spots and derivatives transactions (not on OTC transactions) would levy between €57 and 122 billions. If the tax cannot be implemented on derivatives transactions but on spots and OTC, the revenue would be included between €62 and 143 billions. But if FTT concerns only spot transactions, the revenue would be around €14 billions.**

A currency transaction tax (CTT) of 0.005% on euro only could rise €9,7 billions ($12,29 billions) and €13 billions ($16,5 billions) for a CTT on euros and pounds, according to Schmidt (2008). Spratt (2006) estimates a revenue of €5.5 billions for Europe (with a tax rate of 0,005%) and of €10.8 billions for a rate of 0,01%. Estimations are lower due to the growth of foreign exchange markets between the two studies and some slight changes in the tax base. An estimate made by the French Treasury[6] for a tax rate of 0.01% found a possible revenue from €7 to 11 billions. Other studies (Felix and Sau, 1996; Frankel, 1996) found much higher estimates (up to $300 billions a year worldwide) due to lower elasticity of transactions volume to the tax rate and other underlying assumptions. Nevertheless, **most of recent studies**

6 Ministère de l'Economie, des Finances et de l'Industrie (2000)

found a possible revenue included between €5 and 13 billions for a currency transaction tax for a rate between 0.005% and 0.01%.

To conclude this section on the revenue potential of a financial transaction tax, potential effects will largely depends on the tax base of such a tax. If both spot, derivatives and OTC transactions can be taxed, a 0.05% tax can raise between €105 and 250 billions. But if OTC are excluded from the tax base, revenue fall to €57-122 billions. If only spot transaction can be taxed, the revenue would be around e14 billions. A currency tax transaction on euros and pounds would raise less revenues.

Whatever is the revenue potential of such a tax, principle of fairness can be evoked to justify it. Due to the high fiscal cost of such a crisis, it seems reasonable to raise the contribution of banks and financial sector. European Commission (2010b) or IMF (2010a) recommend a bank levy instead of a FTT. However, as noticed by Schulmeister (2010), some detrimental activities of banks would remain unaffected by a bank levy. Both contributions can be seen as complementary. We should also notice that the revenue potential of such a tax can be used for different purposes. If it can be an effective tool to help fiscal consolidation, it may also contributes to other goals such as the financing of global public goods. In particular, it has often been seen as an innovative way to finance international development (European Commission, 2005; Innovating financing to fund development, 2010). A significant share of the revenue collected could be dedicated to an increase of european ODA.

Laslty, we should remind that if a financial transaction tax can be seen as a way to reduce excessive markets volatility and raise revenues, there is an obvious trade-off between the two goals. If the incentives work well, most of short-term speculation would disappear but the tax base will also be eroded and tax revenues very low. In other words, a low revenue is not necessarily a feature of the policy inefficiency. That's why Tobin was not so much interested in his initial proposal on the revenue potential, focusing firstly on financial stability. If revenue is low but financial stability increase, the measure can be considered as successful. However, the idea of a broad financial transaction tax with a very low tax rate goes ahead with the idea of revenue maximization.

4. New progress in tax coordination (including a European corporate tax base)

The lack of tax coordination in Europe raises several problems (Bond, Chennells, Devereux, Gammie, and Troup, 2000). The first one is the possible loss of government revenues. Firstly, because of the race to the bottom that can be induced by fiscal competitions among states. In order to attract firms, governments may be tempted to lower their corporate tax rate and thus, the revenues collected by this tax. Free mobility of capital may lead firms to move towards low corporate tax rate countries. We observed in the European Union a fall of the tax rate in the last 30 years, from relatively high rates (sometimes higher to 50% in some member states) to a rate between 10% and 40% today. However, in the same time, governments enlarged the tax base so the revenue generated by the tax has been stable over the period (Loretz, 2008).

Devereux, Lockwood, and Redoano (2008) show that the reductions in equilibrium tax rates can be explained almost entirely by more intense competition generated by the relaxation of capital controls. Changes of business behaviour may also reduce government revenues. Firms may exploit differences of tax rate and tax base to minimize their contribution by, for example, manipulating transfer prices without transferring economic activities. One could consider that the setting of transfer prices rules can solve this problem, but it increases administrative costs. Differences on the type of deductions may also affect the business behaviour. It is very difficult to find empirical evidences of tax-minimizing activities. However, some studies found companies pre-tax profits tend to be inversely correlated with the tax rate (Grubert and Mutti, 1998; Hines and Rice, 1994). de Mooij and Ederveen (2008) analysed the studies on the effects of corporate tax and estimated to -1.2 the average elasticity between corporate tax rate and profit shifting. The lack of tax coordination may also create distortions to the “real economic behaviour”. Differences in corporate tax systems may affect the choices of locations for multinational firms. A low tax rate may compensate high labour costs or low productivity. Firms may be tempted to locate where productivity is lower due to a more favorable tax environment. Less efficient companies may also become profitable if they are less taxed than other more efficient firms. Also, differences in tax systems

may be seen as an obstacle of the single market within the EU. The literature largely studied the determinants of FDI and thus the influence of tax on choices of location for multinational firms. Devereux and Griffith (1998) found that decisions of US multinational firms over where to locate within the European Union was negatively affected by the average effective tax rate. This result is confirmed by Bénassy-Quéré, Fontagné, and Lahrèche-Révil (2005). Head and Mayer (2004) found a negative effect of effective corporate tax on the location decision of Japanese multinational firms in Europe. Hines (1999) considered that the elasticity between FDI and corporate tax rate is about -0.6%. de Mooij and Ederveen (2003) analyzed the results of 25 studies on this issue. They found that, in average, a rise of corporate tax rate of 1% induces a fall of FDI of 3,3-4%. Clausing (2007) estimates the relationship between tax rate and tax revenues for a panel of OECD countries. He finds a parabolic relationship between these two variables, implying a revenue-maximizing tax rate of 33%.

The last problem of the lack of tax cooperation is higher compliance and administrative costs. 27 different fiscal systems increase the administrative burden for firms. Lanno and Levin (2002) estimate these costs from 2 to 4 % of total corporate tax revenues raised. European Commission (2002) retains a rate of 1.9%. Tax cooperation may decrease theses costs by 25%. Different proposals of fiscal harmonisation were made at the European level. In 1962, the Neumark Committee proposed the harmonisation of tax systems. In 1975, the European Commission proposed a band between 45 to 55% for the corporate tax rate. In 1992, the Ruding commitee proposed a band from 30 to 40% and a set of minimum standards for the corporate tax base.

Fiscal harmonisation can be seen in different ways:

- Harmonisation of the corporate tax base: the idea is to harmonise the definition of the taxable profit, but keeping different corporate tax rates
- Harmonisation of the corporate tax rate: by the setting-up of a minimum tax rate, a band of tax rates or a unique tax rates among all member states
- A European Union corporate income tax (IUCIT): this can be done in different ways: (1) as a replacement for national income taxes, (2) as the corporate income tax for companies located in different member states, or (3) in addition to the national corporate income taxes.

- Home state taxation: each participating country recognize the corporate tax of others participants. Gammie and Lodin (1999) proposed different versions of the system. In the first version, total EU-wide profit would be calculated using the tax base of the home state and profits allocated between different countries according to a rule of allocation. Then each state can apply different tax rates. Another version of the home state taxation is to retain both tax base and tax base of the home country and then to reallocate the revenues generated to different countries.

European Union already made some progress in the fight against "harmful tax competition" with the adoption of a Code of Conduct designed to curb "those business tax measures which affect, or may affect, in a significant way the location of business activity within the Community". The European commission launched a process in 2001 in order to make further progress in fiscal harmonisation. The main goal is to define a common consolidated corporate tax base. A common consolidated corporate tax base working group was created and meet on a quarterly basis in order to make concrete proposals. If the European commission was supposed to propose a concrete legislation in 2008, nothing has been agreed until now. The Monti Report (2010) on the single market only states that "the specific design of the proposal (the common definition of corporate tax bases) requires a careful attention, but the time seems mature to move forward", without other details. Monti also proposed to relaunch the Code of Conduct Group on harmful business taxation.

4.1 The current EU commission proposal: a limited budgetary impact

The European Commission (2007) proposed an optional European corporate tax base, including a consolidation process at the European level. They clearly mentioned that they did not include the rate in their discussions, focusing only on a harmonisation of the tax base. The commission was supposed to propose a legislative proposal in 2008.

The main conclusion emerging from the literature is that **an optional European corporate tax base is likely to reduce revenues.** The current proposal of the European commission cannot be seen as a part of a potential EU revenue package. For this, more ambitious tax coordination is needed. As mentioned by Devereux, Lockwood, and Redoano (2008), the

reason is very simple. If the system is optional, fims will participate to the new system only if they benefit from lower aggregate taxes. If they correctly anticipate their tax liabilities, total tax revenues must decline. The Monti Report (2010) does not come back on this point and last proposals included in the last available document from the common consolidated corporate tax base working group (European Commission, 2007) clearly describe an optional mechanism.

Fuest, Hemmelgarn, and Ramb (2007) studied the possible revenue effects of an EU tax base with formula apportionment (FA)[7]. This analysis is based on German firm-level FDI data in combination with balance sheet information on the parent companies. The main conclusion is that if a FA system with border crossing loss offset, the EU-wide corporate tax base would decline by about 20%[8]6. If we suppose that the tax rate does not change[9], taking the corporate tax revenues for all European Unions in 2008 as a basis[10], the fall of tax revenues would be €68 billions for all the European Union. A system without border crossing loss offset would have fewer consequences for large countries while many smaller countries would tend to loose part of their tax base.

Taking into account the limitations of the data of the first study presented above, Devereux, Lockwood, and Redoano (2008) use a large set of unconsolidated firm-level data at the European level. They also allow for the time dimension in setting losses against taxable profit: "Consolidation

7 "*With formula apportionment, an EU company reports its total EU profit to each country and then a (currently unspecified) formula that could be based upon factors such as revenue shares, wage shares, and/or capital shares will determine the portion of the company's total EU profit that would be taxed in each country*". (Gresik, 2010).

8 However, the authors underline the limits of their study. First, it is based on German multinationals which cannot be seen as representative of all EU multinationals. Second, in their sample period (1996-2001), subsidiaries of German firms in the EU experienced large losses. The authors recognize that *"It cannot be excluded that losses would be smaller if a longer period had been available".*

9 We do not take into account here the possible effects of the introduction of an FA system on the setting of the corporate tax rate. Severals papers specifically deal about this issue. In particular, Riedel and Runkel (2007) argue that introducing an FA system when there are tax havens which are not subject to FA would induce an inefficient overtaxation due to a negative externality of corporate taxation. Becker and Fuest (2010) consider effects would be opposite due to positive externality of tax enforcement on the tax revenue of other countries. Effective tax rates may be too low in this case.

10 According to Eurostat, the amount of taxes on the income or profits of corporations including holding gains for 2008 in European Union (27 countries) was €342023,1 millions.

in the current year therefore requires an adjustment to taxable profit declared in subsequent periods, which will imply higher tax revenues.". They also estimates the impact on tax revenues assuming different formula apportionment. In average, an optional common tax base will induce a fall of revenues of 1% (around e3.4 billions for all European Union). Even under these assumptions that we can consider as more reliable than the one of the Fuest, Hemmelgarn, and Ramb (2007) study, an optional European corporate tax base cannot raise revenues at the European level.

But the authors also consider an alternative case, in which a common consolidated corporate tax base would be compulsory for all European firms. Under this system, tax revenues would now increase by between 7.9% and 8.7%. According to these estimates, **a compulsory common consolidated corporate tax base can raise European revenues by between €27 and 29,7 billions**, depending on the formula apportionment chosen.

To conclude, harmonisation of corporate tax base among European countries would have positive effects on public revenues only if the common tax base is not optional. One should also notice that potential effects, especially at the national level, will largely depend on the choice of the formula apportionment[11].

4.2 Other scenario of tax coordination

In order tax coordination increase revenues for the European Union, several other options may be studied. Copenhagen Economics (2004) simulated different scenarios of corporate tax harmonisation for the EU25. Brøchner, Jensen, Svensson, and Sørensen (2006) proposed an extension of the same study. Tax coordination is supposed to have two effects: it raises the tax burden is some countries and reduces it in other countries. A rise of taxes is supposed to reduce GDP but to increase welfare if it allows a rise of transfers and thus a fall of inequalities. The second effect is the reduction of cross-countries differences in effective tax rates that may affect location decisions of multinational firms. According to these assumptions, the main effects of tax coordination would be a redistribution effect among member

11 See Fuest (2008) and Devereux, Lockwood, and Redoano (2008) for a more detailed discussion on formula apportionment.

states. Here, a gain in GDP comes at the cost of lower tax revenues. Conversely, a loss in GDP goes generally together with higher tax revenues. Globally, this study concludes that potential effect of fiscal harmonisation is in the order of 0,5% for GDP and less for welfare. In terms of GDP and welfare, Sorensen (2004) globally found the same effect analysing the effects of regional tax coordination. He nevertheless put in evidence that a global tax coordination (Tanzi, 1999) would have much stronger effects.

There is a fundamental dilemna in the studies of Copenhagen Economics (2004) and Brøchner, Jensen, Svensson, and Sørensen (2006). Fiscal coordination will create winners and losers within the European Union. This calls for compensation between countries. The main difficulty is that losers in terms of GDP are countries where tax revenues raise. Winners in terms of GDP have lower tax revenues. It means that countries with lower revenues would have to compensate countries with higher revenues which seems unrealistic. That's why the authors propose to start with enhanced fiscal cooperation among relatively similar countries. Gains would be lower but would lead to "less radical policy changes".

Table 3: Effects of different fiscal harmonisation scenario (Copenhagen Economics, 2004)

Scenario	Tax base	Tax Rate	Rate	Countries	GDP	Welfare	Total revenues
1	Yes	Yes	27,2%	EU25	+0,75%	+0,2%	-0,55%
2	Yes	Yes	32,6%	EU25	+0,4%	+0,06%	+0,0%
3	Yes	Yes	31%	EU15	-0,05%	+0,1%	+0,05%
4	Yes	Yes	31,5%	Euro	-0,18%	+0,1%	+0,25%
5	Yes	Yes	33%	EU15-A	-0,4%	+0,05%	+0,38%
6	Yes	Yes	mini 20%	EU25	+0,15%	+0,05%	-0,2%
7	Yes	Yes	mini 25%	EU25	+0,1%	+0,05%	+0,01%
8	Yes	Yes	mini 30%	EU25	+0,05%	+0,2%	+0,12%

Source: Copenhagen Economics (2004)
EU25 refers to all European Union member countries (except Bulgaria and Romania that entered EU in 2007. Euro zone refers to the 12 countries that have already adopted Euro in 2004. EU15 includes all EU members prior to 2004 and EU15-A all EU15 member states except the United Kingdom, Ireland, Denmark and the Netherlands.

However, we should notice that this study is based on the simplifying assumption that a corporate tax increase has only a direct and negative effect on GDP. However, other effects may offset this possible direct cost. If an increase of revenues collected allows more redistribution, we can expect a rise of internal demand explained by a higher consumption propensity for low income households. Also these revenues may finance new investments in infrastructure or other public goods that may have positive effects on GDP. Taking account these indi-

rect effects may lead to less clear-cut conclusions on the negative links between corporate taxes and GDP.

In fact, it appears that fiscal harmonisation only can be welfare and GDP-enhancing but it does not appear to be, as such, an efficient policy tool to increase public revenues. In order to do so, only an additional European corporate tax may have significant effects on European revenues.

4.3 How tax coordination may increase European revenues?

Tax coordination (both harmonisation of tax base and tax rate) may have positive effects by reducing the gap between effective tax rate among European countries. We saw that a compulsory common European corporate tax base may increase tax base by around 8% (Devereux, Lockwood, and Redoano, 2008). A minimum corporate tax rate of 30% may also slightly increase public revenues (by about 0.12%) with positive changes both for GDP and welfare (Copenhagen Economics, 2004).

Additionally, some economists (see Piketty (2010) for instance) proposed to collect a 10% points at the EU level in order to raise European budget. In order to estimate the possible revenues generated by this measure, we need to estimate the elasticity between tax rates and tax revenues. A main problem from such an increase may come from income shifting. Bartelsman and Beetsma (2003) found that 65% of the additional revenue from a unilateral increase may be lost due to income shifting[12]. **Even if we retain this large estimate of income shifting, a 10% points increase in all European corporate tax rate may have significant effects (roughly around €40 billions)**[13]. Furthermore, in this scenario, income shifting

12 Others authors use different methodology to measure elasticities between tax rates and tax revenues. de Mooij and Ederveen (2008) estimates the elasticities of corporate tax rates. They found that an average increase of 1% of corporate tax rate will reduce corporate tax base by around 3%. Here once again, a coordinated increase in corporate tax rate will have a much lower effect on the corporate tax base. Clausing (2007) found a non-linear relationship between corporate tax rate and tax revenues with a top at 33%.

13 We obtain this estimate using the corporate tax revenue from EUROSTAT (taxes on the income or profits of corporations including holding gains) and estimate a proxy of the corporate tax base using corporate tax rate. From this hypothetical tax base, we calculate a potential tax revenue applying a 10% points increase for all corporate tax rate in each country. Then, applying the result of Bartelsman and Beetsma (2003), we retain only 35% of additional revenue in order to take into account possible income shifting. Of course, it is a rough esti-

within European Unions would not be possible so the estimate 65% of income shifting (Bartelsman and Beetsma, 2003) may be overestimated in our case. Considering an income shifting between 33% and 66%, we obtain an additional revenue included between €40 and 78 billions for all European Unions.

To conclude, we can reasonably say that an additional european-wide corporate tax rate, combined with a compulsory common consolidated tax base, can raise substantial revenues. Nevertheless, more studies are needed, in particular to estimate the impact of a coordinated increase of corporate tax rate at the European level on the tax base.

5. An EU-led initiative at global level (G20 and OECD) to step up the fight against tax havens within a clear timeframe

The fight against tax havens is, in many ways, linked to the debate over tax coordination and tax competition. Because of the fear of income shifting towards a tax haven, lots of governments reduced their corporate tax rates and thus their revenues. Fiscal evasion is a huge source of public imbalances. Desai, Foley, and Hines (2006), from an analysis of affiliate-level data for American firm, show that "the primary use of affiliates in larger tax haven countries is to reallocate taxable income, whereas the primary use of affiliates in smaller tax haven countries is to facilitate deferral of U.S. taxation of foreign income". According to Hines (2004), major tax havens have less than one percent of the world's population (outside the United States), and 2.3 % of world GDP, but host 5.7 % of the foreign employment and 8.4 % of foreign property, plant and equipment of American firms. Palan, Murphy, Chavagneux, and Mousli (2009) counted between 45 and 60 tax havens in the World which host 2 millions of firms. Around 50% of international banking loans and 30% of the stocks of FDI would be located in such countries.

mate that should be confirmed by a more detailed study. First, it is necessary to take into account effective tax rate in order to get a better approximation of tax base. Second, the elasticity between tax rate and tax revenue should be more studied especially for new member states. Here we consider a linear utility which is a strong assumption.

It is very difficult to assess the cost of tax havens on public finances in non-havens countries. Harel (2010) considers the costs for public finances are roughly €200 billions in Europe and €20 billions in France, but it is not clear if it is an approximation of the total costs directly linked to tax havens or a proxy of total tax evasion.

After the G20 summit in London, more than 300 agreements have been signed in order to meet OECD standards on tax transparency and effective exchange of information. According to the OECD, all countries have committed to the internationally agreed tax standard (OECD, 2010).

6. A common and effective European strategy against tax fraud with annual national targets

IMF (2010b) reports VAT compliance gap (the difference between actual and potential VAT revenues) between 20% in some countries (Italy and some other EU countries) and 10% in others (France or Germany for instance)[14]. According to the same source, improving revenue administration and combating tax abuse could yield an extra-revenue equivalent to 0.8% of GDP in G-20 countries. For the European Union, it means an extra-revenue of roughly €94 billions. International VAT Association (2007) estimates VAT tax fraud to be $80-$140 billions in 2006 (€60-€108 billions).

According to the IMF (2010b), tax fraud erodes tax revenues through four channels: (1) informality (according to Schneider, Buehn, and Montenegro (2010), ranged from 8-30% of GDP), (2) aggressive tax planning, (3) offshore tax abuse (see previous section), (4) tax fraud and (5) unpaid tax debts. Brondolo (2009) also shows that tax compliance tends to be lower due to the current crisis. In order to improve the medium-term fiscal position, IMF (2010b) proposes four priorities: (1) intensifying international collaboration, especially in exchanging tax information, developing sound risk-based compliance strategies, (3) strengthening legal frameworks and (4) exploiting new information technology to better align tax compliance management with businesses' life-cycles.

14 See also International VAT Association (2007) for estimates of VAT fraud among some EU member states.

The European Commission (2006) expressed the need to develop a coordinated strategy *"to improve the fight against fiscal fraud"*. According to this communication, fraud may accounts for 2-2.5% of GDP (€235-295 billions). It may be more in some countries. Richard Murphy estimates fiscal evasion in the UK to be around 6% of GDP[15]. In Greece, income under-reporting is estimated at 10%, resulting in a 26% shortfall in tax receipts (Matsaganis and Flevotomou, 2010). In Sweden, The Swedish Tax Agency (2004) estimates the total gap as a percentage of taxes to be 9 percent in 1997 and 8 percent in 2000. However, it is very difficult to get reliable estimates because of obvious statistical problems (see Slemrod and Yitzhaki (2002) for a detailed discusssion).

In the US, data are more reliable due to extensive studies about the tax gap made by the U.S. Internal Revenue Service (IRS) (see Slemrod (2007) for a detailed description). The overall net noncompliance rate for all U.S. federal taxes and the individual income tax could be around 14 percent or $ 290 billions (Slemrod, 2007). About two-third comes from individual income tax. The rate of evasion seems to vary a lot depending on the type of income. If only 1% of wage income is under-reported, 57% of non-farm proprietor income is not reported. Pissarides and Weber (1989) reached similar conclusions from the UK.

Unfortunately, as stated by Slemrod (2007), it is not clear in the literature "in what way or how much enforcement might most efficiently be increased." The normative theory of taxation gives some insight on the trade-off between the costs and benefits of tax enforcements. But empirical knowledge is sparse.

To conclude this section, it is very difficult to assess how much revenues can be collected through a "common and effective European Strategy against tax fraud". IMF (2010b) suggests this estimate of 0.8% of GDP for G20 countries. **€94 billions could be collected at the European level according to this estimate, if the European strategy is effective.** But this statistic should be taken very cautiously as it depends on a lot of parameters. Also, tax fraud is heterogeneous. The fight against tax evasion from firms would need an active international policy against tax haven. Fraud on personal income taxes or on VAT would require differ-

15 Statistics reported by Palan, Murphy, Chavagneux, and Mousli (2009).

ent political and fiscal tools. In order to estimate the final effects, we would also need more estimates on the costs of an improvement of tax enforcement.

7. A EU-wide CO2 tax

With the rise of environmental concerns and the possible huge economic costs explained by climatic change, there is a strong pressure for fostering the transition towards a low carbon-intensive economy. In order to change production and consumers patterns, there are two main kinds of economic instruments: the tax and the cap-and-trade system. Both instruments have the same goal: pollution is a negative externality that firms and consumers do not take into account when they produce or consume. The idea is then to give a price to the pollution in order to "internalize the externality" and change incentives for firms and consumers. Economists generally agree to consider that these instruments are less costly than regulation (see for instance Ekins and Barker (2001) for an overview)[16]. If European Union was traditionally more in favour of a environmental tax than a cap-and-trade system[17], this latter was included in the Kyoto protocol and the European Union accepted to put in place an European Union Emission Trading Scheme (EU ETS) which most of big polluting European firms have to respect now.

However, the debate on the possibility to include a Carbon tax, in parallel with the EU ETS system, came back in lots of member states. Already such a tax exists in different countries (Sweden, Denmark and Finland). The use of two instruments simultaneously may create some problems, especially if the two systems lead to a different price for carbon (Tirole, 2009). However, as only large European firms are concerned by the EU ETS system, there is a place for a complementary system of taxation in order to increase the global efficiency of the European policy. Also, countries that already implemented a Carbon tax are strongly in favour of a European coordination in order to

16 However, regulation may be preferred for political reasons. Regulation may reflect collective preferences. If the primary goal is to cut some sources of pollution whatever the cost is, regulation may be more effective than other economic instruments which effectiveness depends on the incentives and their impact on firms and consumers behaviours. Also, the economic analysis behind the "internalization of externalities" is largely linked to general equilibrium models and some strong assumptions underlying these models.

17 The European Commission already propose a Carbon Tax in the early 90's but the proposal could not be agreed at the European level.

reduce the possible comparative disadvantage created by the differences between carbon taxation among member states. It was also the argument retained by the French government to reject the proposal of a Carbon tax.

We should take into consideration that energy taxation already exists in various ways in different member states. Each system may have different purposes, including revenue creation for governments. Some taxes are directly targeted to reduce CO2 emissions. Other may have this indirect effect but with a primary policy goal to raise revenues (such as the taxation of fuel). According to ADEME (2009), the "implicit[18] level of Carbon taxation" is in average of €47 by CO2 ton. The European Commission (2009) proposed to "introduce an explicit distinction between energy taxation specifically linked to CO2, emissions attributable to the consumption of the product concerned (CO2-related taxation) and other types of energy taxation. The current proposal is to include in a EU-wide CO2 tax, agriculture and transport, two key polluters excluded from the EU ETS system. Member states would have to levy a CO2 tax on fuel in order to cut emissions, with a minimum rate set by the Commission.

One fundamental point is that a carbon tax is not primarily directed to raise public revenue. The primary goal is to change the incentive for firms and consumers in order to reduce their emissions of CO2. Thus, contrary to other taxes, the goal of the carbon tax is clearly to reduce the base of the tax, ie. the total CO2 emission. One corollary of this assumption is that the revenue generated by such a tax is likely to be decreasing over time if the tax rate is kept constant. This has to be taken into consideration while setting the use of the revenues generated by the tax.

Nevertheless, tax revenues may increase if the tax rate raises over time. Nordhaus (2010b) proposes for instance to start with a low tax and to increase such a tax gradually[19]. In this case, the rise of the tax may compensate the fall of the tax base (the emissions). It is exactly the idea of Nordhaus (2010a) who suggests that a Carbon tax implemented gradually in the

18 The implicit level of carbon taxation takes into consideration direct taxation or pricing of Carbon but also the indirect effects coming from other taxes.

19 Stern (2006) opposed this argument considering extensive and immediate actions are needed, and not gradual ones. Their conclusions diverge mainly because of differences in retained discout rates. If a carbon tax is applied immediately at a very high level, then we can expect that revenues would be high in a first period but then will decrease quickly due to strong incentives to reduce CO2 emissions.

United States may "*help to move towards fiscal sustainability*". He proposes to put in place a carbon tax of 25$ a ton in 2015 and then to increase it gradually (up to 128$ a ton in 2035). According to his estimates, such a tax would yield $134 billions in 2015 (0.6% of GDP) and up to $528 billions in 2035 (1.1% of GDP). Green, Hayward, and Hassett (2007) found that a 25$ a ton tax would yield $122.6 billions.

Estimates for the European Union are scarce. The European Commission (2010b) reports estimates of the revenue generated by such a tax where it is already in place. In Finland or in Denmark, the tax yields around 0.3% of GDP for a price below €20 a ton. In Sweden, revenues are higher: 0.81% for a much higher tax (e108 a ton). Pearson and Smith (1991) estimated the possible effect of the EU commission proposal of 1991. They estimates a possible revenue-raising potential included between 0.9 and 2.6% of GDP.

The most complete studies estimating tax revenues for Europe is maybe the one of Barker and Rosendahl (2000). They estimate the possible impact if European countries would have managed to reach the goals set by the Kyoto Protocol. They propose two alternative policies and estimate the impact on revenues, GDP, employment and other macroeconomic variables. In order to reach Kyoto goals in 2008-2012, a tax of €153 would have been necessary, which would yield a revenue of €170 billions. In the case of a mixed policy (combining a carbon tax and an emission trading scheme), the price of ton for the tax would be similar and the price of a permit would be €147.8 a ton. Estimated impact would be then €108.4 billions for the tax and €30.7 billions for the ETS. Concerning the ETS, the European Commission (2010b) gives the same estimate but with a much lower price of carbon (30 €).

Table 4 gives an overview of the main results found in the literature. It is very difficult to estimate the possible effect of the introduction of a EU-wide carbon tax at the European level for different reasons:

- It will depend on the type of tax and which kind of products would be taxed. The European Commission proposed to tax firstly transports and agriculture. A mixed-tax combining taxation of carbon and taxation of energy is also often proposed (as the European Commission proposed in 1991). The argument is that a taxation of energy

gives more incentives for energetic efficiency improvement and is a way to tax nuclear electricity also. The french proposal excluded electricity from the base of the tax (see Schubert (2009) for a discussion).

- We found only one estimation (Barker and Rosendahl, 2000) in the case of a mixed-policy (tax and permit). It was only for EU15 and taking as parameters the goals of Kyoto. More studies would be needed, to evaluate for instance the effects of the last European climate plan.
- Revenues would also depend on the strategy chosen: a gradual introduction as proposed by Nordhaus (2010a) or a direct high level of tax as suggested by Stern (2006).

Table 4: Revenue-Raising potential of a Carbon tax

Source	System	Revenue-Raising Potential	Note
EC (2010)	EU-ETS	25,8 billions of euros by 2020	Price ton of carbon: €30
EC (2010)	Carbon tax	0,29% of GDP 0,3% of GDP 0,81% of GDP	Finland for a price of €20/ton Denmark for a price of €12/ton Sweden for a price of €108/ton
ADEME (2009)	Carbon tax	8 billions per year in France	Price ton of Carbon: €32
Pearson & Smith (1991)	Carbon tax (EU proposal of 1991)	Between 0,9 and 2,6% of GDP	
Green et al. (2007)	Carbon tax	55,7 b$ (10$ per ton) 80,2b$ (15$ per ton) 102,5b$ (20$ per ton) &	for the US 122,6b$ (25$ per ton)
Nordhaus (2010)	Carbon tax	2015: 123b$ (25$ per ton) 2020: 184b$ (39,7$ per ton) 2025: 282b$ (63$ per ton) 2030:386 (89,8$ per ton) 2035: 528b$ (128,1$ per ton)	for the US
Barker & Rosendahl (2000)	Carbon tax Mixed policy (Carbon tax + ETS)	€170b €108,4b (tax) + €30,7b (ETS)	Price ton of Carbon: €153 Permit price €147.8

In order to get a rough overview of the possible additional revenues: we can retain the effective results of such a tax on public finance in Finland, Denmark and Sweden. If we assume that it would have the same effect in other European countries (which is a strong assumption), it could yield between €35 and 95 billions a year at the European level for a tax between 12 and 110 €.

As already mentioned, the revenue-potential of the carbon tax is not the primary goal of this tax. That may explain why the number of studies estimating this revenue-potential is scarce. As stated by Schubert (2009), *"Carbon tax is not designed to be a financing tax but an incentive tax. In order to be seen as such, all the revenues created have to be redistributed fully."* In other words, **the use of a carbon tax for fiscal consolidation may not be optimal.**

It is clearly shown that this kind of tax is regressive. The percentage of expenses in energy is higher for the poorest households (Zhang and Baranzini, 2004) and households living in rural area. These households would be the first loosers of a Carbon tax. The collected revenues may be high enough to offset the regressive feature of the tax. If the redistribution is well-featured, the tax may even become progressive.

We should not underestimate the potential problem of political acceptability of such a tax. As shown by the debate in France, a carbon tax cannot be accepted until people have the feeling the tax is fair and the tax burden equally shared. That's why it is crucial that **revenues created are used to finance redistribution policies.** Two proposals can be made (Schubert, 2009). The first one is to divide the total amount of the carbon tax paid by households by the number of households and to redistribute this average amount. The second one is to redistribute all the amount paid by households and firms. Schubert (2009) considers this last option is fairer because firms will, most probably, increase their prices in order to take into account the cost of the tax so consumers will indirectly pay also the tax on firms. In order to increase the tax acceptability, she also proposes to tax only over a certain level of energy domestic consumption and to put in place specific programs of assistance for the "fuel poors" (see for instance the fuel poverty action plan created in 2001
in the United Kingdom).

There is another debate concerning the possible *"double dividend"* emerging from the carbon
tax. The first dividend is an environmental one. The second one is an hypothetical economic one. In order to reach this second dividend, the revenues should be use to improve "economic efficiency" by decreasing other taxes. In particular, taxes on labour could be reduced in order to decrease labour costs. However, the possibility to see a second dividend is chal-

lenged theoretically. It will mainly depend on the elasticity of labour supply and real wage, and on the substition elasticity between non-polluting goods and energy. Empirical evidences on this double dividend are also very weak. Puatelli, Nijkamp, and Pels (2005) made a meta-analysis of 61 studies on this issue and found a very small effect of carbon tax on employment. Evidences concerning the effects on growth are also very discussed. Bovenberg (1995) or Schubert (2009) thus recommend not to focus on this economic dividend and to use the potential revenues for other purposes (such as redistribution).

8. Conclusions

Current financial and economic crisis have huge consequences on public budget deficit. Governments had to massively intervene in order to pull out economies from recession. Public deficit also massively increased due to the effects of automatic stabilizers. The crisis in Greece and the speculation against euro raise the issue of fiscal sustainability. Coordination of governments was slow and further improvements may be needed to increase cooperation among member states. European Commission already calls for fiscal consolidation policies in order to come back to the debt-to-GDP ratio of 60% by 2020. However, crisis is not over and excessive austerity may have
adverse effects on economic growth and employment.

One solution to improve fiscal sustainability without threatening economic recovery would be to transfer part of national debts to the European level. In order to reimburse the debt, new financial resources may be found at the European level. It may be part of a revenue package including a financial transaction tax, improvement of tax coordination, fight against fiscal fraud and evasion and a European-wide carbon tax.

Reviewing the literature on the possible effects of these different measures, we show that a significant part of the fiscal adjustment needed to reduce public debts, can be financed through a European revenue package. Table 5 sums up estimates of the revenue-potential of each of the proposed measures. Globally, a European revenue package may yield between €300 and 500 billions. However, these estimates have to be taken cautiously and should be confirmed by more concrete estimates for the European case. In particular, we only report

here estimates of possible effects in partial equilibrium and do not take into account the possible impact of each individual measure on the effects of others. Also the impact in terms of economic growth should be further studied.

Table 5: a European revenue package (in €billions)

Financial transaction tax	Tax coordination	Tax fraud	CO2 tax	Total
105-250	28 (compulsory common tax base) 40 (10% increase of corporate tax)	94	35-95	302-507

Also, we argue that all this potential revenues should not be dedicated only to fiscal consolidation. A European budget and improvement in fiscal federalism may be profitable the European economy in order also to run contra-cyclical policies. Moreover if a European-wide carbon tax is judicious, revenues created by such a tax should not be use to reimburse public debts but to make redistributional policies in order to offset the regressive effects of such a tax. Finally, if a financial transaction tax can yield lots of additional revenue, part of these revenues may be used for other purposes such as the financing of global public goods or international development.

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