FROM DEFICITS TO DEBT AND BACK: POLITICAL INCENTIVES UNDER NUMERICAL FISCAL RULES

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> "European governments are hiring private sector banks to help them disguise the scale of budget deficits, Joaquin Almunia, European Union monetary affairs commissioner, claims ... Mr. Almunia says that some banks recommend the same budgetary dodges to different governments, making it hard to police the EU's budgetary rules that underpin the single currency". (*Financial Times*, 5 October 2005)

Under numerical fiscal rules, such as those underpinning EMU, governments have strong temptations to use accounting tricks to meet the fiscal constraints. Given these political incentives, fiscal variables that in the past were regarded as a mere residual acquire a strategic role. This is the case of the so-called stock-flow adjustment (SFA) which reconciles deficit and debt developments. We develop a simple theoretical model where deficits and two distinct SFA components (one that could be used to reduce the deficit figures and the other to impact debt figures instead) are determined as a result of a constrained optimization by fiscal authorities. Econometric evidence provides results consistent with the model findings. The SFA component related to the purpose to hide deficits rises with the recorded deficit, while the sales of financial assets designed to keep the debt under control rise with debt and deficit. Such practices have greatly contributed to the loss of credibility of EMU's fiscal rules. If properly implemented, the reformed Pact, which stresses durable adjustment and long-run sustainability, should help curb such perverse incentives.

1. Introduction

Europe's Economic and Monetary Union (EMU) is built on strong fiscal discipline foundations. The budgetary autonomy of the members of the euro area is subject to the numerical constraints of the Maastricht Treaty and the Stability and Growth Pact (SGP). The Treaty prescribes that budget deficits should not exceed 3 per cent of GDP, unless exceptional circumstances occur and, even in this case, the

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excess should remain limited and temporary. Public debt should not exceed 60 per cent of GDP or, if this is the case, it should be maintained on a downward trend. While the numerical parameters of the Treaty were seen as a screening device to select the members of the euro area, the goal of the SGP – which set medium-term objectives of close-to-balance for EU member states – was to make fiscal discipline a permanent feature of EMU.

Such rules triggered a strong fiscal adjustment in the run up to EMU: the average budget deficit of the euro area was reduced from a peak of 6 per cent of GDP in 1993 to less than 1 per cent at the turn of the century. Public debt, which registered a quasi continuous increase from about 30 per cent of GDP in the mid 1970s, reached about 70 per cent of GDP in mid-1990s and started to decrease, albeit very slowly, thereafter. While both variables however went into reverse in the last few years under the effect of poor economic growth and "adjustment fatigue", the threat of going back to the reckless behaviour of the pre-Maastricht era has not materialised.

A dark side of EMU's fiscal rules, however, quickly emerged. Accounting tricks, one-off operations, exotic transactions and legally dubious data manipulations to circumvent the constraints on deficits and debt became frequent. The political incentives in evading real adjustment was recognised in the early days of the new Treaty: "Maastricht encourages financial engineering to avoid underlying fiscal adjustment. Even when privatisation is desirable for efficiency reasons, it is bad economic policy to do the right (structural) thing for the wrong (financing) reasons" (Buiter *et al.*, 1993).[1]

In spite of indications that window-dressing activities associated with fiscal rules could be sizable and anecdotal evidence piled up, a major difficulty in carrying out empirical research has been the lack of systematic information. One way to overcome this difficulty is a "bottom up" estimation obtained summing up the value of the operations, which have been identified as falling under the category of creative accounting. This is the route that followed Dafflon and Rossi (1999) and, more recently, Koen and Van den Noord (2006). The latter construct measures of "fiscal gimmickry" taking into account both one-off measures improving budget balances and creative accounting operations and find that the probability of fiscal gimmickry increases with the level of deficits in EU countries. Of course, the limitation of this approach is that it cannot be exhaustive: many operations aimed at strategically manipulate the statistical definition of deficits will not be captured.

A second option is the one followed by Easterly (1999) and Milesi-Ferretti and Moriyama (2004) who take a "balance sheet approach" to analyse fiscal

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[1] This is obviously not a wholly new or EMU-specific phenomenon. Actually, most of the empirical evidence comes from the fiscal behaviour of the States in the US. Von Hagen (1991) and Bunch (1991) show that borrowing constraints imposed on US states have led to the substitution of non-constrained for constrained debt instruments. Strauch (1998) shows that expenditure ceilings at US state level have induced a shift from the constrained current budget to investment expenditure which is unconstrained. See also Bunch (1991) and Sbragia (1996).

adjustment.[2] If a government has not embraced fiscal adjustment in earnest (via a lowering of its discount rate), it will respond to a budgetary constraint by reducing its asset accumulation or increase its hidden liabilities by an equal amount, leaving net worth unchanged. Hence, the improvement in the fiscal balance or the reduction in the debt ratio do not reduce the need for future higher taxes. Looking at EU countries in the 1990s, Easterly (1999) notices that privatisation in the original eleven countries of the euro area after Maastricht (*i.e.*, after 1991) more than quadrupled while it fell in the UK, Sweden and Denmark. He concludes that the combination of basically unchanged public expenditure growth, one-off measures, the proliferation of privatisation and public investment reduction suggests that at least part of the fiscal retrenchment in response to the Maastricht constraint was illusory. Milesi-Ferretti and Moriyama (2004) find that during the run-up to EMU, the change in the stock of debt is positively correlated with changes in government assets during the same period while it is weakly correlated with changes in net worth. Despite a fall in the stock of public assets, net worth deteriorated between 1992 and 1997 in almost all EU countries. By contrast, in the period 1998-2002, net worth improved notwithstanding declining government assets. The authors interpret this as due to a lower pressure to use non-structural measures arising from the lower penalties for missing the fiscal targets once in the euro area.

In this paper, we choose a largely complementary approach by studying in detail the so-called stock-flow adjustment (SFA), namely the discrepancy between the accounting value of deficit and the change in debt. This option is all the more relevant in the EU context as the relative attention to the two criteria of the Treaty has changed over time and, since the introduction of the SGP, the focus has increasingly shifted on the deficit criterion which has been the only one to receive serious attention in the public debate.

In the literature on public debt accumulation, the SFA is usually disregarded or treated as a mere residual. Such a shortcut is acceptable only to the extent that the SFA is small and cancels out over time. This is what one would expect from a composite residual variable made up of several items moving in opposite directions. However, if one tried to reconstruct the debt series for years 1991 to 2005, disregarding the SFA, the cumulated error would exceed 4 per cent of GDP for the euro area as whole. More importantly, for a number of member states, the difference is much larger and may reach 10 per cent of GDP in single specific years, or above 40 per cent of GDP cumulated over the above indicated period. The non-weighted average of yearly SFA-to GDP ratios from 1991 to 2005 is 0.8 per cent of GDP and the absolute average is 1.8 per cent of GDP.[3]

Economic analysis has started only recently to pay attention to the behaviour of the SFA. In a seminal paper, von Hagen and Wolff (2005), building on the theoretical model by Milesi-Ferretti (2003), show that under the SGP where greater

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2 For an early suggestion of a balance sheet approach, see Buiter (1985).

3 See also European Commission (2005) for an illustration of recent developments in the SFA in EU countries.

attention is paid to the deficit, governments tended to shift expenditure to below the line thus increasing the SFA. The authors find a systematic relationship between SFA and deficit after the introduction of the SGP. Under such a fiscal rule, where the deficit criterion receives considerable more attention than the debt (or than the yearly debt developments), governments do have an incentive in underreporting their deficits or in packaging or describing their transactions in such a way that the gap between deficit and debt widens.

However, von Hagen and Wolff (2005) use an aggregate measure of the SFA. This does not allow to capture the different political incentives in an environment in which the degree of stringency of the deficit and debt criteria may vary across time and countries, and the costs associated to SFA also vary among its components. In particular, first, there may be very good reasons for persistently positive and even large value of SFA: as shown by the authors themselves (see their Table 1), amongst the largest values of the SFA over the last two decades are found in Finland, Denmark and Luxembourg, all countries where the fiscal constraints did not bite (apart from a short period at the beginning of the 1990s in the two Nordic countries. Second, low total SFA – as in Italy or Portugal – may be the result of hidden expenditure offset by sales of financial assets (privatisations).

In this paper, we identify distinct SFA components that are associable with accounting gimmicks aimed at embellishing the deficit and at reducing the debt. We develop a simple theoretical where deficits and two distinct SFA components (one that could be used to hide part of the deficit and the other to reduce the debt figures instead) are determined as a result of a constrained optimization by fiscal authorities. We then provide econometric evidence on the strategic use of the SFA components by fiscal authorities.

The remainder of the paper is structured as follows. Section 2 presents a descriptive analysis of the SFA by focussing on size, composition and the ability of fiscal authorities to strategically use them. Section 3 develops a simple model of a government with short-term growth objectives, but with its room for manoeuvre thwarted by fiscal constraints akin to those of EMU. Section 4 provides empirical evidence on the determinants of government operations that affect the SFA in an environment in which the budget criteria of Maastricht and the SGP constraint fiscal behaviour. The final section summarises our finding, provides some considerations on how the reform of the SGP will affect such perverse political incentives and suggests further work.

2. The stock-flow adjustment: why does it exist?

2.1 A composite entity: the main components of the SFA

This section describes the components of the SFA; by doing so, it also explains why the variable exists in the first place. It elaborates on each of the components and reports on the available data. It then discusses on their

manipulability by government with the aim of painting their deficit and debt figures – especially the former – in rosier tones.

The SFA can be broken down in several different ways. We have found useful to break it down into three components. Two components reflect basic differences in the accounting basis for the deficit and the debt, while the third category gathers residual adjustments.

(a) *Differences between the accrual and cash bases of recording transactions*

The government expenditure and revenue are recorded on an accrual basis, that is at the time of the underlying transaction irrespective of effective cash payments and receipts. In contrast, the debt is a cash concept; it increases or decreases with effective debt issuance or redemptions. These ultimately depend on effective cash payments and cash receipts, not on the underlying revenue and expenditure.

The transactions that have been recorded as expenditure or revenue – and therefore have contributed to increase or reduce the deficit, but for which the effective cash payment or receipt has not yet taken place, are accounts receivable or payable.[4] Therefore, the issuance of zero-coupon bonds, the reimbursement of bonds that do not regularly pay coupons, the accumulation of revenue arrears, the settlement of payment arrears and the payment of expenditure in advance, the reimbursement of taxes, etc. result in positive SFAs (debt increase by more than the deficit in a specific period). Symmetrically, interest accrued by zero-coupon bonds, or by other bonds that do not regularly pay coupons, the accumulation of payment arrears, the collection of revenue in arrears, and the collection of excessive taxes that will need to be reimbursed, etc. lead to negative SFAs.[5]

It needs stressing that the differences between cash and accruals accounting should cancel out over the years. In the medium-term (let us say five years), the cumulated flows of accounts receivable and payable should converge to zero, or simply reflect nominal growth.

Figure 1 shows data on the cash and accrual discrepancies for each of the EU member states. Cash and accrual discrepancies for interest and other revenue and expenditure items are shown separately. The difference between cash and accruals appear relatively small for most countries. However, the data for Greece, Italy and, to an extent, Portugal stand out: even over a 5-year period during which plus and minuses should cancel out, the cumulated discrepancy is positive and large. Taking into account that these three countries were under

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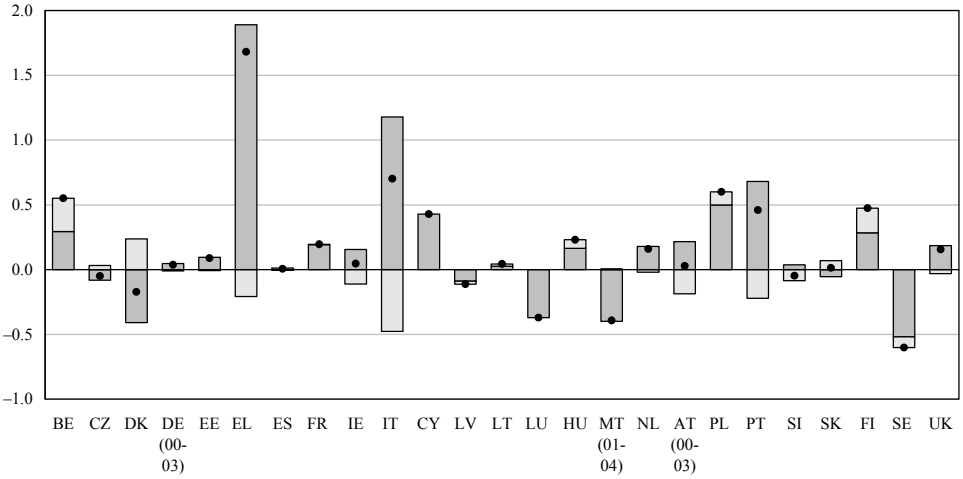
[4] Accounts payable usually refer to expenditure, and accounts receivable to revenue, but the reverse is also possible: there are also accounts payable in relation to revenue (e.g. taxes to be reimbursed), and accounts receivable in relation to expenditure (e.g. cash payments in advance of deliveries). Accounts payable are government liabilities, and statisticians do recognise them as such. However, they are not considered in the government debt for EDP purposes.

[5] We have merged statistical discrepancies in the member states' financial accounts into accounts receivable and payable. This is because experience suggests that most statistical discrepancies (that is, differences between deficit and debt figures that statisticians are unable to attribute to any specific SFA component) are the result of the intricacies of accrual accounting. Moreover, in a number of countries, statistical discrepancies between financial and non-financial accounts are not specifically identified in their accounts but merged under accounts receivable and payable.

Figure 1

Time of Recording: Cash and Accruals, Average 2000-04
(percent of GDP)



pressure to avoid excessive deficits and, the first two have a large stock of debt, the political incentives to hide budget deficits may have been at work.[6]

(b) *Differences between the net and gross recording in relation to financial transactions*

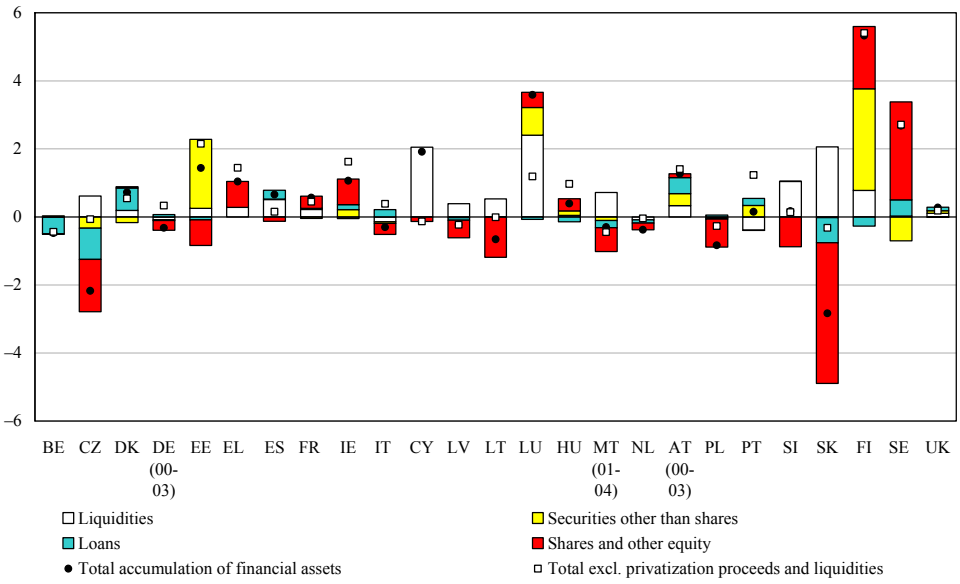
A second major difference between deficit and debt accounting – in fact the one that has the largest impact on data – concerns the accumulation (or decumulation) of financial assets.

The government deficit is a net concept. It is defined as government *net* borrowing. This means that it corresponds to the difference between revenue and expenditure excluding financial transactions. In contrast with the deficit, the debt is measured in gross terms. No government assets are netted from the government liabilities when compiling the debt. When the government accumulates financial assets and therefore needs to finance their acquisition, the gross debt increases even if the government deficit and net worth would remain

[6] It should be noted also that, since the extraction of the data for this paper in spring 2005, there have been significant revisions in the accounts of a these three countries which led to smaller differences between cash and accrual data by reclassifying items from below to above the line, thereby increasing the budget deficit.

Figure 2

Accumulation of Financial Assets, Average 2000-04
(percent of GDP)



unchanged. Therefore, the accumulation of financial assets leads to positive SFA, and the decumulation of financial assets (e.g. privatisation) implies a negative SFA.

Data available allow distinguishing the net accumulation of financial assets in four categories: liquidities, loans, securities other than shares (that is, private-issued bonds traded in the stock exchanges) and shares and other equity. Data on these components are shown in Figure 2.

The member states that have registered the largest accumulation of financial assets are those that have been in surplus and have relatively small debts, such as Denmark, Estonia, Luxembourg, Finland and Sweden. Given that the government gross debt in these countries is low or very low, the accumulation of assets is preferable to redemption of debt.

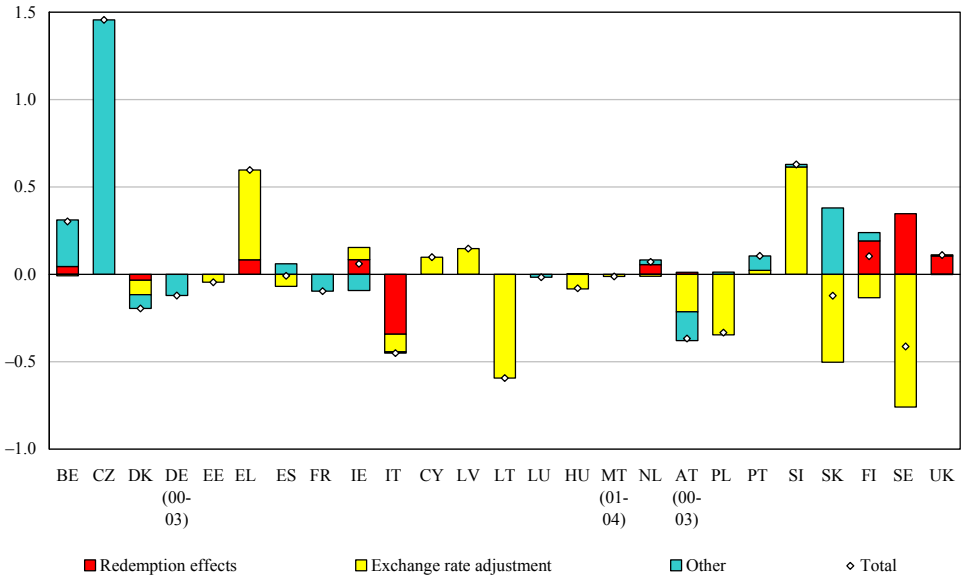
(c) *Valuation effects and other statistical adjustments*

The third component of the SFA concern valuation changes, reclassifications and other technicalities. Figure 3 shows data on this SFA category. The adjustments because of exchange rate movements are now very small in almost all member states. They used to be much larger in several countries before the creation of the euro area. Concerning early reimbursements, the two more interesting cases concern Italy (the replacement of a low-interest bond with a high interest bond

Figure 3

Valuation Effects and Residual Adjustments, Average 2000-04

(percent of GDP)



and lower face value at the end of 2002) and Sweden (the reverse transaction in 2000). Concerning the residual "other", it is worth to refer to large reclassifications into government of liabilities in connection with banking restructuring in the Czech Republic and Slovakia.

2.2 Not so much a residual: the strategic use of the SFA

The basic question this paper addresses is whether and how the SFA can be used strategically by a government that bears political costs when the deficits violate some numerical constraint, while at the same time it is wishes to increase public spending and reduce taxes to stimulate economic activity or please the electorate.

As the previous section has shown, the SFA is the result of many different developments. A large SFA that depends predominantly on the accumulation of assets quoted in the stock exchange by a government in surplus has a considerably different nature from a large positive SFA because of the increase in the share capital of distressed public enterprises, a depreciation of national currency, because the government had to settle a large stock of spending arrears or simply because cash and accrual statistics do not match. Which of the SFA components can then be used as strategic variables to disguise its deficits? We propose here two alternative decompositions of the SFA that permit to isolate the elements that are more likely to

be subject to a strategic use by fiscal authorities to reduce deficits. To simplify language, in the remainder of the paper we will refer to the set of these SFA items as "hidden deficits", "disguised deficits", or "accounting gimmicks".

Irrespective of the approach chosen to measure the hidden deficit, the "valuation effects and other statistical adjustments" component of the SFA are disregarded. Because of the heterogeneous and erratic nature of this variable, it is likely to depend mainly on events outside government control. Moreover, it is likely to be small or negligible for most EU countries under normal circumstances.[7]

(i) *A conservative measure of hidden deficits: difference between cash and accrual measures of deficit*

In an economy with liquidity restrictions, one may expect that cash receipts and payments could be of a more direct use to appease the electorate and accelerate economic activity than government revenues and expenditure. However, since the latter are those that are relevant in the EU budgetary surveillance, governments have an interest in reducing the deficit in accruals and increasing the cash deficits, by increasing the effective revenue collection lags and reducing the cash payment lags. In principle, one could expect that this strategy would only be used in specific critical moment, such as immediately before an election or in the vicinity of a commitment related with fiscal discipline frameworks like the Stability and Growth Pact, as the difference between cash and accrual accounting is just a matter of timing. Yet, the message conveyed by Figure 1 above is at variance with these considerations. The differences between accruals and cash in the accounting of revenue and expenditure for a few countries – with specific budgetary concerns – seems to be persistent. This suggests that government might also try to minimise their deficits via inconsistent cash and accrual statistics.[8]

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[7] Note, however, that in some specific circumstances, member states may also put in place a number of deficit- or debt minimising strategies, which would be reflected in this category. A case in point is the issuance of foreign debt. Assuming covered interest parity, it should be invariant to issue debt in low-yield currencies for which there is an expectation of appreciation or in high-yield currencies for which there is an expectation of depreciation. The expected revaluation of foreign debt is a cost similar to interest expenditure, as it will imply a reimbursement by amount which is higher (in national currency) that received at issuance. However, costs stemming from the revaluation of foreign currency denominated debt are booked below the line (as SFA) and not in the deficit. This means that governments that wish to minimise the deficits could have an interest in issuing debt in low-yield currencies even if this would increase their exchange-rate risk. Another example concerns the early redemption of government debt; Italy has provided an example in 2002 when it replaced a low-interest bond with a high interest bond and lower face value with the aim of artificially accelerating the reduction in Maastricht debt. Some reclassification of units (e.g. indebted public enterprises that are reclassified from the corporate sector to government) may also be the result of the hiding-deficit strategies; however, the fundamentals (accumulation of losses in public enterprises) are not directly connected with the timing of the reclassification.

[8] This means that governments have an interest in keeping low quality statistical systems if this results in a minimisation of their deficits.

(ii) *A comprehensive measure of hidden deficits: taking into account disguised government subsidies*

The above measure of hidden deficits can be made more comprehensive. Indeed, there is a number of transactions in financial assets that may also take place first and foremost with the aim of hiding deficits.

Not all assets are equal. The purchase of blue-chip shares by social security investing its surpluses is not of the same nature of an injection in the share capital of a loss-making public enterprise by central government. Therefore, it would be useful to distinguish between high-quality assets and low-quality assets. The former are the financial investments which take place at market conditions and which would be accepted by a profit-maximising private investor. The latter are those which the government enters into for public policy purpose, in particular those that replace deficit-increasing subsidisation and may be determined by the wish of hiding some expenditure.

We believe that the variables "liquidities and securities" can be safely classified in the first group as high-quality financial investments, as the private also do the same financial investments. Loans are a less clear case. For a government which attempts to minimise its deficit, it may be preferable from an accounting viewpoint to grant a loan than to directly provide a subsidy. In some cases, given national budgetary rules, it may also be easier to grant loans rather than to provide direct subsidisation. Ultimately, one would have to distinguish loans granted by government according to beneficiaries' rating, and the specific conditions of each loan. However, as this information is not available, we will assume that loans granted by government do contain an element of hidden expenditure.

In relation to shares, the distinction between good and bad assets could be attempted by separating the shares which are quoted in the stock exchange and the non-quoted shares, in particular in enterprises which are controlled by government. However, in this case there is also a severe data-availability problem.[9] On the basis of the available data, we found useful to distinguish three categories, namely, transactions in shares by social security (which we presume to correspond to a profit-maximising behaviour of investing surpluses in high-quality assets), other transactions in shares (where we assume on the basis of anecdotal evidence that the low-quality shares predominate), and privatisation (that is large sales of government-owned shares, which ultimately lead to shift the control of a public firm to private hands).

3. Political incentives under numerical rules: a simple model

As pointed out above, numerical rules for deficit and debt provide incentives for creative accounting. To analyse formally how such incentives affect budgetary

[9] The ESA95 rules and nomenclature does distinguish between quoted and non-quoted shares, and according to who controls the enterprise. However, most countries do not publish data with this detail.

behaviour, we develop a simple model of a government subject to numerical deficit and debt constraints. In spite of its evident limitations, the model helps capturing relevant aspects of the trade-off faced by policy makers in devising budgetary policies and schemes to embellish the budgetary position.

The idea underlying the model is simple. Fiscal authorities use fiscal policy to achieve short-term growth objectives. However, because of the operation of the EU fiscal rules, budget deficits as well as debt developments diverging from those compatible with the EU Treaty are perceived as costly. SFA operations may alleviate the perceived cost of deficits and debt, by permitting to improve the figures which are used in EU budgetary surveillance, at least temporarily. Such operations, however, may also entail a cost, associated mainly with reduced transparency (accounting gimmicks are badly perceived by the public opinion and EU institutions) and distortions in the composition of government balance sheets. Under these conditions, governments will trade off the benefits of higher deficits (short-run boost to growth) with their cost (the formal and informal sanctions of the EU fiscal framework). Analogously, the marginal gains from undertaking SFA operations will be equated to their marginal costs.

The model permits to derive some testable predictions concerning the relation of SFA and its components with deficits, debt, rules for fiscal discipline, and factors affecting government preferences, like elections.

3.1 Model set-up

The first relation in the model links deficits and short-run growth. In the short-run, prices are sticky, so that output is demand-determined. It follows that fiscal policies that increase deficits by cutting government receipts or by raising payments contribute positively to short-run growth. Assuming for ease of notation an initial deficit equal to zero, we write:

$$y = \phi d \tag{1}$$

where y is real output growth, d is the deficit as a share of output, and ϕ is the fiscal multiplier. A key assumption is that economic activity is influenced by this notion of "true" deficit in cash terms.[10] As in the EU fiscal rules, however, the numerical constraint applies not to the true deficit in cash terms, d, but to the national accounts, accrual-based definition, of budget deficit, d^M (where the superscript M stands for Maastricht):

$$d^M = d - x \tag{2}$$

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[10] This measure of deficit overlaps only partly with that advocated by Balassone and Monacelli (2000) and Balassone *et al.* (2004) as the most correct indicator of annual budgetary behaviour. In those definitions most SFA components enters the deficit. Our definition of deficit also overlaps only partly with the "bare" deficit as defined by Koen and van den Noord (2006) who strip out of the Maastricht deficit also one-off operations.

where x corresponds to the hidden deficit, namely the SFA component that may be "manipulated" by fiscal authorities with the specific aim of affecting the Maastricht deficit (see Section 2.2 above).

The debt accumulation identity, disregarding inflation, can be approximated as follows:

$$\dot{b} = d - y\, b - z \tag{3}$$

where b is the debt/output ratio, $\dot{b}$ is the time change in this ratio, and z denotes financial operations carried out by governments that do not affect the deficit but reduce the debt (*i.e.*, sales of financial assets).[11]

The numerical rule on public debt states that the debt to GDP ratio, b, as long as it is above a given value, $\bar{b}$, should preferably be reduced at a speed α, implying that the distance of the debt from its target value should be reduced by α points a year:

$$\dot{b} = \alpha\left(\bar{b} - b\right) \tag{4}$$

Equation (4) formalises the Treaty requirement that the debt, until it is above the reference value of 60 per cent of GDP, should be reduced at a satisfactory pace.[12]

We postulate that the government aims at attaining a given level of output growth, call it $\hat{y}$. The government has three instruments at its disposal: its effective cash receipts and payments which lead to the "true deficit" in cash terms (d); the hidden deficit (x), and transactions in financial assets which contribute to reduce the government debt (z). Fiscal authorities need to respect as far as possible constraints on deficit and debt similar to those in the EU. Accounting gimmicks (x) can be used to limit the deviation from the deficit objective, but they are assumed to carry a political cost as such operations trigger enhanced surveillance due to the suspicion that the government may be engaged in unlawful accounting practices. Similarly, financial operations (z) permit the government to come closer to the objective for the debt path, but also these measures carry a cost, related in this case to the possibility of a sub-optimal composition of government balance sheets.[13]

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[11] From (2) and (3), it emerges that the SFA, net of valuation effects and residual statistical adjustments (which to simplify are assumed to be purely erratic), equals $x - z$.

[12] Such an expression has been used to represent the debt Maastricht rule by e.g. and Buti *et al.* (1998). Gros (2003) shows arithmetically that with constant 5 per cent nominal growth of GDP, a constant budget deficit of 3 per cent of GDP ensures a speed of reduction of the debt in excess of 60 per cent of GDP of 5 per cent a year.

[13] For instance, a privatisation programme pursued during times of weak demand by financial markets may lead to undervaluation of the assets previously held by the government and to a reduction in the government net worth.

The following government loss function attempts to capture in a simplified fashion the objectives of and constraints on government budgetary behaviour:

$$L = (y - \hat{y})^2 + \theta_1 (d - x)^2 + \theta_2 \left[\dot{b} - \alpha\left(\bar{b} - b\right)\right]^2 + \theta_3 x^2 + \theta_4 z^2$$

For convenience, and without an impact on qualitative results, it is assumed that the objective value of d^M is zero for each country and at each period. The government minimises the L with respect to d, x and z.

3.2 Model solution

The solution of the optimisation problem for x and z can be expressed as a function of the true deficit level as follows:[14]

$$x^* = \frac{\theta_1 d^*}{\theta_1 + \theta_3} \tag{6}$$

$$z^* = \frac{\theta_2 [(\alpha(b - \bar{b}) + d^*(1 - \phi\, b)]}{\theta_2 + \theta_4} \tag{7}$$

As for the solution of the true deficit, it is determined in the following way:

$$d^* = \frac{\phi\, \hat{y} - (1 - \phi\, b)[\alpha(b - \bar{b})](\theta_2 \theta_4)/(\theta_2 + \theta_4)}{\phi^2 + (1 - \phi\, b)^2 (\theta_2 \theta_4)/(\theta_2 + \theta_4) + (\theta_1 \theta_3)/(\theta_1 + \theta_3)} \tag{8}$$

The above solutions hold as long as $b > \bar{b}$ (in the opposite case, it is assumed that $z^* = 0$ and $d^* = \frac{\phi\, \hat{y}}{\phi^2 + (\theta_1 \theta_3)/(\theta_1 + \theta_3)}$). In addition, we suppose that $\phi\, b$ < 1, which guarantees that that higher deficits lead to an increase in the debt/output ratio, namely, $\partial\, \dot{b} / \partial\, d > 0$. This amounts to assuming that the impact of deficits on the numerator of the debt/output ratio prevails over the denominator effect: a condition that is likely to hold in reality and consistent with the dynamic efficiency of economies. In our case, this condition also guarantees $\dot{b} > 0$ whenever $d > 0$, so that the minimum rate of debt reduction is always binding when $b > \bar{b}$.

Accounting gimmicks, x, depend positively on the deficit. This result follows from the fact that the model permits to analyse the interaction the determination of

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[14] The solution for x and z could equally be expressed as a function of the Maastricht deficit, noting that:

$$d^{M*} = d^* - x^* = \left[\theta_3 / (\theta_1 + \theta_3)\right] d^*$$

deficits and that of SFA components. If fiscal authorities find it optimal to run high deficits, they will also have more incentives to hide such deficit and avoid that d^M exceeds a given threshold. It is to notice that such result differs from that in Von Hagen and Wolff (2005), who take the desired change in the debt/output ratio as exogenous. In such setting, deviating by the desired debt path entails a cost, but it is also costly violating deficit limits, with the cost increasing with the square of the distance with respect to the deficit ceiling. In this set up, when deficit ceilings become binding the expected relation between deficits and the SFA is negative, because the SFA will be used to accommodate the difference between the targeted change in debt and the deficit threshold.

Financial operations z depend *directly* both on the debt and the deficit. Under the assumption ϕb<1, and $b > \bar{b}$ there is more decumulation of assets by the government if deficits increase (e.g., privatisations, becomes more likely and accumulation of assets less likely). To meet the target rate of debt reduction, fiscal authorities need to compensate via the SFA the increase in the debt/output ratio implied by higher deficits. The impact of the standard debt level (at *given* deficit) on government financial operations is *a priori* ambiguous, and depends on parameter values. There are two contrasting effects at play. On the one hand, if the debt/output ratio is high, a stronger reduction in debt is necessary to comply with the target debt-reduction rate, and this leads to more sales of financial assets. On the other hand, a higher speed of debt reduction can be achieved, via the denominator of the debt/output ratio, by an expansionary budgetary policy; hence, ceteris paribus a lower z would suffice. This second effect is stronger the higher the starting level of debt, so, a lower decumulation of asset would be sufficient to achieve a given rate of debt reduction the higher the starting level of debt. This simply reflects the well-known result according to which an acceleration in economic activity leads to a faster fall in the debt ratio for the more indebted countries. The prevalence of the first effect requires $\alpha > \phi d^*$, *i.e.*, that the target reduction rate of debt is relatively high compared with the equilibrium level of the deficit. Under the conditions prevailing in the EU and in light of the prescriptions of the EU fiscal framework, the above assumption is likely to be satisfied, so that we should expect higher debt ratios going hand in hand with larger debt-decreasing financial operations.[15]

Finally, concerning the equilibrium level of the deficit *d*, it is to note the ambiguous impact of the debt. On the one hand, the higher the debt, the lower the deficit compatible with the respect of the debt rule. This effect is reflected at the

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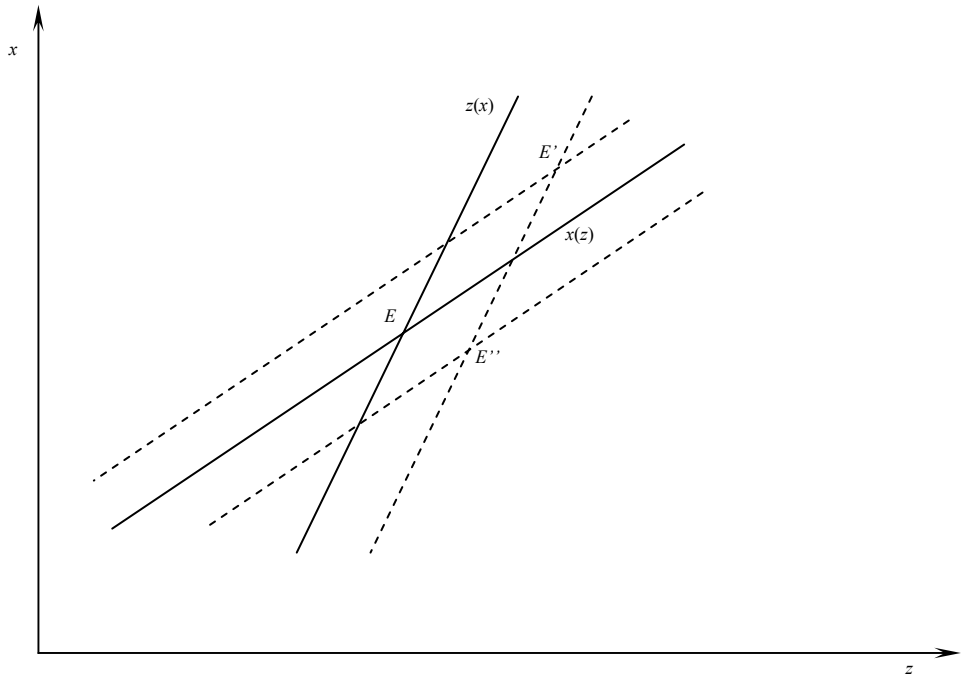
[15] Parameter α is not spelled out in the EU fiscal framework. However, a lower bound for such a parameter could be inferred from the path for convergence of the debt ratio towards 60 per cent of GDP consistent with a deficit of 3 per cent of GDP, nominal GDP growth of 5 per cent and disregarding SFA. (Such a benchmark has been used by the European Commission since 2004 in the assessment of stability and convergence programmes). In this case, α would be 5 per cent. Such a value for α would most likely satisfy the condition:

$$\alpha > \phi d$$

Figure 4

The Equilibrium Relation between Stock-flow Adjustment Components



numerator of equation (8). On the other hand, a higher level of debt implies a higher sensitivity of debt developments to growth, and therefore a higher incentive to put in place expansionary budgetary policies. This effect is visible both at the numerator and at the denominator of equation (8). Which effect prevails depends upon the parameters of the model. In particular, a high (low) value of α implies that the first (second) effect prevails, so that the equilibrium deficit falls as the debt/output ratio grows.

The impact of more ambitious growth objectives ($\hat{y}$ rises) moves the equilibrium from E to E'. More stringent debt development requirements (α rises or $\bar{b}$ falls) shots the equilibrium from E to E''.

3.3 Comparative statics

The full solution of the model for what concerns the SFA components considered in our analysis can be characterized in the (x, z) space as illustrated in Figure 4. Both the $x(z)$ locus and the $z(x)$ locus are upward-sloping (see Appendix 1). More financial operations reducing the debt (z) permit to run higher

deficits, which need in turn to be accompanied by accounting gimmicks that reduce "Maastricht" deficits. If more accounting gimmicks (x) are put in place, deficits can be higher, and therefore more sales of financial assets are needed to avoid an excessive growth in the debt/output ratio.

The equilibrium solution is represented by point E in Figure 4. There are parameters in the model that produce a parallel shift in the $z(x)$ and $x(z)$ loci. This is the case for the growth objective $\hat{y}$, the stringency of the debt-reduction rule, α, and the degree of ambition of the debt target, inversely measured by $\overline{b}$.

An increase in $\hat{y}$ implies a higher desired deficit and therefore an upward shift in $x(z)$ and a downward shift in $z(x)$, thus leading to a new equilibrium (E' in Figure 4) with both more accounting gimmicks and more sales of financial assets.[16] Note that the overall impact on the overall SFA is uncertain, since while x increases the SFA, z reduces it.

A debt rule that becomes more stringent (higher α) or a debt target that becomes more ambitious (lower $\overline{b}$) lead instead to less accounting gimmicks aimed at hiding the deficit and to more sales of financial assets (see Appendix 1 and 2). In this case, the overall SFA unambiguously falls: there is less deficit, less hidden deficit and more sales of financial assets that contribute to reduce the debt. The new equilibrium is represented by point E''. Clearly focussing on the total SFA would not allow to capture such effects.

The other parameters of the model induce both a shift and a tilt in the schedules so that comparative statics by means of graphical analysis becomes less straightforward. Appendix 2 illustrates some comparative statics results obtained via differentiation of the analytical solutions of the model. The debt/output ratio in particular has an ambiguous impact on the deficit and therefore also on x and z.

Parameter θ_1, the weight given in the government loss function to the deficit objective, has two opposing effects on accounting gimmicks. On the one hand, a higher θ_1 rises x given the deficit; that is the difference between the "true" deficit and the "Maastricht" deficit rises. On the other hand, d, the deficits before accounting gimmicks falls, and this entails a lower value for x at equilibrium. It can be shown that the first effect always prevails, so that a higher weight given to the deficit objective unambiguously leads to more hidden deficits. As for the impact of θ_1 on z, it only comes through d, and is unambiguously negative. Overall, a more stringent rule (or a stronger perception of its relevance) leads to more SFA: more hidden expenditure to embellish the deficit figures used in budgetary surveillance as well as less accumulation of financial assets to avoid an excessive growth in the debt/output ratio.

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[16] This result is in line with that of Milesi-Ferretti (2003) who shows that fiscal rules interfering with the cyclical stabilisation function of fiscal policy give rise to creative accounting in periods of cyclical slumps.

The effect of θ_2 on d is negative if the latter is positive (*i.e.*, if the "true" budget balance records a deficit, as it has been most often the case in EU countries in the recent past). The impact of θ_2 on x s negative because less accounting gimmicks help ensuring faster debt reduction. However the effect of θ_2 on z would be ambiguous instead, due to two opposite effects: the direct one, which raises z, and indirect one, via a lower d. With reasonable parameters, one should expect z to increase as θ_2 rises. Under the same condition, a reduction in the deficit and in both x and z would follow from an increase in θ_3 and θ_4, the parameters capturing the reputation cost that the hidden expenditure will be revealed and the costs connected with the sale of financial assets.[17]

4. Empirical evidence

Inspired by the model illustrated in the previous section, we provide in this section empirical evidence on the determinants of government operations that affect the SFA. Two basic messages emerge from the above analysis. First, the different components of the SFA are explained by different type of determinants. In this respect, the model permits to identify a limited number of variables that are likely to affect the SFA, and to form an *a priori* on the expected sign of explanatory variables in regression analysis. Second, deficits, hidden deficits and sales of financial assets are determined simultaneously: the deficit is not independent on the government choices affecting the SFA. This means that, if included among the regressors, deficits need to be instrumented with other variables to overcome simultaneity problems.

The sample we use consists of observations on all EU 25 countries over the period 1994-2004. For the ten new member states, the sample is shorter.[18] The source of the data is Eurostat, and, for what concerns SFA data prior to 2001, the ECB.[19] We perform fixed effect panel regressions over this sample to analyse the determinants of the SFA and its different components. The estimation method is

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[17] The recent attempts to reinforce the capacity of Eurostat to scrutinise the government accounts can be interpreted as an increase in θ_3.

[18] The sample for the ten new member states starts in 2000; there are severe data quality problems for earlier years. We assume that these countries started behaving strategically in a similar way to member states in the years immediately before accession. Though they were formally subject to the Stability and Growth Pact from 2004 only, they were already reporting their data to the European Commission – under the same format of EU member states – under the pre-accession fiscal reporting. Moreover, the European Commission assessed their fiscal policies in the framework of the pre-accession economic programmes.

[19] The Eurostata data on fiscal and macroeconomic variables used in the analysis were those available in the AMECO database of European Commission's DG ECFIN after the release of the Commission services' Economic Forecast of Spring 2005. All data are according ESA95 accounting rules including for the years prior to 2000, when the accounting standard was the old ESA79 system.

Table 1

SFA Components Used in Regression Analysis. Some Summary Statistics

		Whole sample (EU-25, 1994-2004)	EU-12, 1994-2004	EU-25, 1999-2004	EU-12, 1999-2004
Number of observations		194	112	135	68
Total SFA	Mean (% GDP)	0.41	0.74	0.72	1.2
	Standard dev.	2.14	2.1	2.2	2
"Hidden deficit" SFA (difference between cash and accrual measures of deficit)	Mean (% GDP)	0.23	0.31	0.18	0.33
	Standard dev.	0.96	1.02	0.94	0.96
"Hidden deficit" SFA (accumulation of government loans and shares and equity except for privatisations or if held by social security)	Mean (% GDP)	0.16	0.28	0.21	0.43
	Standard dev.	1.00	0.94	1.01	1.03
SFA related with accumulation of assets	Mean (% GDP)	0.17	0.42	0.53	0.89
	Standard dev.	2.01	1.92	2.1	2.00

two-stage least squares. The standard errors of the regression coefficients are robust with respect to the possible correlation of the disturbances within countries.

We use three alternative measures of the SFA as dependent variable. The first is total SFA excluding the "valuation effects and other residual adjustments" component, which is most often outside the control of fiscal authorities. This measure is akin to that used in Von Hagen and Wolff (2005). The second measure isolates the SFA components which are more susceptible of representing the hidden deficit. These are the SFA components associated with the difference in the time of recording of transactions according to the cash and accrual principle. As illustrated in Section 2.2. of the paper, this subset of the SFA can be seen as a conservative measure of the hidden deficit, and is chosen to provide an empirical counterpart to variable x in the model presented previously. In a later section we will also test a more comprehensive indicator of the hidden which also includes the accumulation of assets that could correspond to disguised government subsidies as discussed in Section 2.2. The third measure of the SFA is the accumulation of financial assets by the government. This corresponds to z in our model taken with minus sign.

Table 1 reports some summary statistics for the different SFA components used in the empirical analysis below as dependent variables. Data on two SFA

Table 2

Correlation among SFA Components – EU-25, 1994-2004

	Total SFA	**"Hidden deficit" SFA (difference between cash and accrual measures of deficit)**	**"Hidden deficit" SFA (difference between cash and accrual measures of deficit)**	**"Hidden deficit" SFA (accumulation of government loans and shares and equity except for privatisations or if held by social security)**
Total SFA	1			
"Hidden deficit" SFA (difference between cash and accrual measures of deficit)	0.23	1		
"Hidden deficit" SFA (accumulation of government loans and shares and equity except for privatisations or if held by social security)	0.16	–0.14	1	
SFA related with accumulation of assets	0.92	–0.14	0.21	1

components associable with "hidden deficits" are reported: the difference between cash and accrual (the conservative proxy for SFA discussed in Section 2.2). and the sum of government loans and shares and equities non related with privatisation and non held by the social security sector (which are a proxy of disguised government subsidies). the sum of these two components yields the comprehensive measure of "hidden deficit discussed in Section 2.2.

Over the whole sample, the SFA is on average 0.4 per cent of GDP per year, split roughly equally between the component related to difference between cash and accrual and the one associated with the accumulation of financial assets by the government. For euro area countries, the SFA is on average higher (above 0.7 per cent of GDP). The SFA is also higher on average in the years after 1998, *i.e.*, after the introduction of the SGP (above 0.7 per cent of GDP). Euro area countries record slightly higher SFA related with difference between cash and accrual after 1998 and considerably higher SFA related with financial assets, including the component attributable to disguised government subsidies. Standard deviation figures show that the SFA component related with differences between cash and accrual is much less volatile than the SFA related with the accumulation of assets.

Table 2 reports correlations coefficients among the various SFA components. The SFA component stemming from differences between cash and accrual is

negatively correlated with that related with asset accumulation, both with the measure of total asset accumulation and with the accumulation of assets that proxy disguised government subsidies.

4.1 Baseline specifications

Table 3 presents the results from the baseline specifications. The explanatory variables considered are the lagged debt/GDP ratio and the ratio of the Maastricht deficit over GDP. This second variable, is instrumented with its own lag, the lagged debt/GDP ratio and the lagged real GDP growth rate. Choosing the Maastricht deficit d^{M*} rather than the "true deficit" d^{*} as a regressor permits not to lose observations when instrumenting, since data on Maastricht deficits are available over longer series compared with SFA data. Our model suggests that this choice should not pose problems in terms of the interpretation of the sign of the regression coefficient since $d^{*} = ((\theta_1 + \theta_3)/\theta_3)d^{M*}$, with both θ_1 and θ_3 positive. Finally, we introduce a dummy taking value 1 for euro-area countries starting from 1998, the first year after the signing of the SGP (SGP dummy). The aim of the dummy is to capture whether the modification of the fiscal framework associated with the creation of the economic and monetary union and the establishment of the Stability and Growth Pact led to a different behaviour of government as far as the operations affecting the SFA are concerned.

Two specifications are considered. Specification (1) in Table 3 considers the SGP dummy affecting only the constant term. The idea is to understand whether the introduction of the SGP increased or reduced the SFA taking the other explanatory factors constant. Specification (2) additionally allows the coefficient for the deficit to vary as a result of the introduction of the SGP. This is what the model presented in the previous section would predict. The table therefore presents two entries for the deficit coefficient. The first is the value of the coefficient in absence of the SGP. The second is the deficit interacted with the SGP dummy, which captures by how much the coefficient of the deficit changes as a result of the SGP.

Consider first specification (1).[20] Looking at the determinants of overall SFA, it turns out that operations that increase (reduce) debt ratios via the SFA are less (more) likely the higher the starting level of debt and the higher the Maastricht deficit. Moreover, looking at the insignificant coefficient of the SGP dummy, it appears that the introduction of the SGP did not have a significant impact on the level of aggregate SFA. Results change when looking separately at the alternative components of the SFA. In the case of the SFA component that proxies accounting gimmicks (*x* in the model), the impact of debt is not significant, while the level of the deficit has a positive and significant effect. Each percentage point of GDP of

[20] The instruments chosen explain a large share of the variance of the deficit variable in all specifications estimated in the paper (R^2 above 0.75 in all cases). In the specifications in Table 1, Hausman tests accept the hypothesis of endogeneity for the "hidden deficit" SFA at the 90 per cent level.

Table 3

The Determinants of the Stock-flow Adjustment:
Evidence from Regression Analysis. Baseline Specifications – EU-25, 1994-2004

Dependent variables / **Explanatory variables**	**Total SFA**	**"Hidden deficit" SFA** (Differences between cash and accrual measures of deficit)	**SFA related with accumulation of financial assets**	**Total SFA**	**"Hidden deficit" SFA** Differences between cash and accrual measures of deficit	**SFA related with accumulation of financial assets**
Specification		(1)			(2)	
Lagged debt *(percent of GDP)*	–0.072***	0.018	–0.0918***	–0.063**	0.023	–0.086**
	(0.02)	(0.01)	(0.11)	(0.03)	(0.01)	(0.03)
Maastricht deficit *(percent of GDP)*	–0.223*	0.093**	–0.318***			
	(0.11)	(0.04)	(0.11)			
Maastricht deficit *(percent of GDP)*, if no SGP				–0.149	0.127***	–0.279**
				(0.10)	(0.04)	(0.10)
Maastricht deficit *(percent of GDP)*, Δ if SGP				–0.413**	–0.195***	–0.218
				(0.19)	(0.05)	(0.21)
Dummy SGP	–0.123	0.505**	–0.628	0.665	0.879***	–0.209
	(0.45)	(0.18)	(0.44)	(0.64)	(0.18)	(0.69)
Number of observations	191	191	191	191	191	191
R^2	0.50	0.21	0.53	0.50	0.28	0.52

Estimation method: two-stage least squares, fixed-effects panel. Hausman tests accept the hypothesis of endogeneity for the "hidden deficit" SFA component at the 90 per cent level. Standard errors are robust with respect to within-panels error correlation. The Maastricht deficit is instrumented with its own lag, the lagged debt, and the lagged real GDP growth rate.

Coefficient standard errors are reported in parentheses. *, **, *** denote, respectively, statistics significant at the 90 per cent, 95 per cent and 99 per cent level.

The coefficients for the fixed effects and the constant term are not reported. The SGP dummy takes value 1 for euro-area countries after 1998. The change in the Maastricht deficit coefficient due to the SGP is computed as the coefficient of the Maastricht deficit times the SGP dummy.

additional deficit increases the hidden deficit by about 0.1 per cent of GDP. These results are in line with the predictions of the model. Furthermore, the SGP dummy is positive and statistically significant: the introduction of the SGP produces an increase in hidden deficits by about 0.5 per cent of GDP. Finally, regarding sales of financial assets, these are negatively and significantly affected both by the debt and by the deficit, a result consistent with the predictions of our model. No significant impact for the SGP dummy is found instead.

Looking at specification (2), the coefficient for the debt variable is substantially unchanged, for all measures of the SFA, compared to specification (1). For the total SFA, the coefficient of the deficit becomes more negative as a result of the SGP as in Von Hagen and Wolff (2005). By considering separately the two SFA components, it turns out that the reduction in the coefficient of the deficit is mostly associated with hidden deficits. This means that in absence of the SGP, accounting gimmicks would normally lead to an increase in the SFA slightly above 0.1 per cent of GDP as the deficit rises by 1 per cent of GDP, while the impact of additional deficits on SFA is almost negligible with the SGP. This evidence can be explained with less cases of countries with deficits above the 3 per cent Maastricht reference value before the entering into force of the SGP and outside the euro area. The evidence reported in Table 5 supports this interpretation. Again, it is confirmed the positive and significant SGP dummy in the case of the hidden deficit variable. The impact of the SGP on the reaction of financial operations aimed at reducing the debt to the level of deficits turns out instead being non-significant.

Several robustness checks have been performed starting from the baseline equations illustrated above which are not reported. First, alternative specifications including also the lagged dependent variable as a regressor to check for a richer dynamic structure have been tried. Results show that the lagged dependent variable is never statistically significant.[21] Second, regressions have also been run including only the countries with a debt/output ratio below 60 per cent. For these countries, the debt-reduction rule does not apply, and the results from the model presented in the previous sections could not be extended. The estimates indeed perform less well. Third, results have been checked with respect to the exclusions from the sample of Luxemburg, Finland and Sweden: countries in which the respective governments have been constantly engaged in substantial accumulation of financial assets because of the large surpluses recorded by social security. Qualitative results are unchanged. Fourth, the same specifications as in Table 3 were tried using the primary cyclically-adjusted (Maastricht) deficit instead as a measure for the (Maastricht) deficit. The most relevant difference compared with the results shown in Table 3 concerns the determinants of the proxy for hidden deficit: the estimated impact of the primary cyclically-adjusted deficit is smaller (in absolute value) and not statistically significant. This result confirms the findings in Von Hagen and Wolff (2005): it seems that the component of deficits that is mostly offset by accounting gimmicks

[21] Dickey-Fuller tests indicate that the SFA/GDP series used as dependent variables are stationary in a number of countries (about 1/3 of the cases as afar as the overall SFA is concerned).

operations is the cyclical component (as suggested in theory by Milesi Ferretti, 2003).

Alternative specifications have also been tested. Results are discussed in the sections that follow.

4.2 Focus on euro-area countries and the impact of elections

Political incentives to circumvent EU fiscal constraints are likely to be particularly strong in electoral periods. As shown in Buti and van den Noord (2004), fiscal policies had an expansionary bias in correspondence to political elections in the early years of EMU. This seems to indicate that the objective of boosting growth via fiscal policy dominated over other objectives, in line with the literature on electoral budget cycles (see references therein).

Table 4 reports the results from two alternative specifications compared with the baseline case. First, the same equations as in specification (2) in Table 3 (allowing for a coefficient for the debt that may change as a result of the SGP) is estimated restricting the sample to euro-area countries only (specification (1) in Table 4). This permits to disentangle to what extent the impact of the SGP is associated with a different behaviour of fiscal authorities to countries outside the euro-area (and therefore not subject to the SGP sanctions) or whether it is rather the result of a changed behaviour in euro-area countries after the introduction of the SGP. A second specification (specification (2) in Table 4) extends the empirical model by introducing an election variable.[22] It is not *a priori* obvious whether the SFA should be larger or smaller in the presence of elections. A first interpretation, in line with electoral cycle theories, is that under elections incumbent governments set more ambitious growth objectives ($\hat{y}$ in terms of the model presented in the previous section). According to this hypothesis, as illustrated in Figure 4, one would expect a positive coefficient for the election variable in the case of hidden deficits, while the coefficient is expected to be negative in the case of financial operations (a slower accumulation of financial assets under elections). However, there are also reasons why one may expect instead that the pace of accumulation of financial assets by the government increases during elections. Under elections, governments may want to keep a high degree of control on economic activities and have therefore lower incentives to carry out privatisation programmes, or may be more prone to bail out private or public corporations via the acquisition of share capital.

Repeating the baseline regressions to a sample of euro-area countries only (specification (1) in Table 4) broadly confirm those obtained considering EU 25 countries. However, there are some noteworthy differences. The sign for the debt variable is as expected, but the coefficient is smaller and not significantly different

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[22] A dummy variable taking value 1 if general elections took place in that particular country, in that particular year.

Table 4

The Determinants of Stock-flow Adjustment: Evidence from Regression Analysis. Euro Area Countries – EU-12, 1994-2004

Dependent variables **Explanatory variables**	**Total SFA**	**"Hidden deficit" SFA (Differences between cash and accruals measures of deficit)**	**SFA related with accumulation of financial assets**	**Total SFA**	**"Hidden deficit" SFA Differences between cash and accruals measures of deficit**	**SFA related with accumulation of financial assets**
Specification		(1)			(2)	
Lagged debt *(percent of GDP)*	–0.0005	0.024	–0.024	0.009	0.026	–0.016
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Maastricht deficit *(percent of GDP)*, if no SGP	0.100	0.152**	–0.048	0.064	0.146**	–0.078
	(0.21)	(0.05)	(0.21)	(0.20)	(0.04)	(0.21)
Maastricht deficit *(percent of GDP)*, Δ if SGP	–0.597***	–0.208**	–0.393*	–0.628**	–0.217**	–0.415**
	(0.19)	(0.07)	(0.20)	(0.16)	(0.07)	(0.17)
Dummy SGP	2.043**	0.966**	1.102	2.103**	0.986**	1.143
	(0.80)	(0.32)	(0.81)	(0.69)	(0.32)	(0.72)
Election dummy				0.701*	0.136	0.572*
				(0.33)	(0.09)	(0.28)
Number of observations	110	110	110	110	110	110
R^2	0.52	0.32	0.51	0.54	0.32	0.53

Estimation method: two-stage least squares, fixed-effects panel. Standard errors are robust with respect to within-panels error correlation. The reported adjusted R square pertains to second-stage regressions. The Maastricht deficit is instrumented with its own lag, the lagged debt, and the lagged real GDP growth rate.
Coefficient standard errors are reported in parentheses. *, **, *** denote, respectively, statistics significant at the 90 per cent, 95 per cent and 99 per cent level.
The coefficients for the fixed effects and the constant term are not reported. The SGP dummy takes value 1 after 1998. The change in the Maastricht deficit coefficient due to the SGP is computed as the coefficient of the Maastricht deficit times the SGP dummy. The election dummy takes value 1 in years where general elections take place.

from zero. The deficit variable instead becomes significantly more negative after the introduction of the SGP. Again, in the case of the SFA component that we assumed to indicate hidden deficits, the coefficient turns from positive to negative. In the case of financial operations the coefficient of the deficit becomes much more negative after the SGP. The SGP dummy affects the constant term much more significantly compared with the baseline case. The overall SFA increases by more than 2 per cent of GDP after the introduction of the SGP, with an almost equal contribution of its two components. Overall, restricting the analysis to euro-area countries, the upward jump in the SFA after the SGP appears more evident.

Specification (2) includes the election dummy among the explanatory factors. The dummy is positive and significant when the dependent variable is the overall SFA. Elections increase the SFA by more than 0.7 percentage points of GDP. The election dummy is positive for both SFA components, with the coefficient only barely significant in the case of the SFA component associated with disguised deficits. This evidence seems to indicate that, consistently with electoral cycle arguments, in the presence of elections the pressure to embellish deficit figures increases, while the accumulation of financial assets by government increases for the possible reasons listed above.

4.3 The impact of excessive deficits

Which impact had the occurrence of deficits in excess of the 3 per cent Maastricht reference value on the SFA? We investigate this issue in the specifications presented in Table 5a and 5b. Specification (1) in Table 5a adds a constant dummy that takes value 1 when the Maastricht deficit is in excess of the reference value. Specification (2) in the same table also admits a different coefficient for the deficit depending on whether the recorded Maastricht deficit is above or below 3 per cent of GDP. In order to overcome endogeneity issues (*i.e.*, the fact that the deficit is above or below 3 per cent may depend on the SFA dependent variable) the 3 per cent dummy is constructed using the lagged value of the deficit. The variable captures therefore those cases for which, in the preceding year, the deficit is above the Maastricht reference value.

Results from specification (1) in Table 5a indicate that the fact that the deficit is above the reference value does not affect per se the overall level of the SFA. The dummy is never significant, for any SFA component. It is confirmed instead that the SGP raises significantly the SFA component associated with hidden deficits.

When the coefficient of the deficit variable is allowed to vary when deficits are "excessive" (specification (2) in Table 5a), results change quite considerably. In the case of the regression concerning the overall SFA, the deficit coefficient is significantly negative when deficits are below 3 per cent and rises significantly when the coefficient becomes "excessive". Looking at the regression for the component capturing accounting gimmicks, it turns out that the deficit coefficient is

Table 5a

The Determinants of Stock-flow Adjustment: Evidence from Regression Analysis
The Impact of Excessive Deficits – EU-25, 1994-2004

Dependent variables **Explanatory variables**	**Total SFA**	**"Hidden deficit" SFA (Differences between cash and accruals measures of deficit)**	**SFA related with accumulation of financial assets**	**Total SFA**	**"Hidden deficit" SFA (Differences between cash and accruals measures of deficit)**	**SFA related with accumulation of financial assets**
Specification		(1)			(2)	
Lagged debt	–0.073**	0.019	–0.092**	–0.060***	0.021	–0.081**
(percent of GDP)	(0.03)	(0.02)	(0.03)	(0.02)	(0.01)	(0.02)
Maastricht deficit	–0.322	0.117	–0.442**			
(percent of GDP)	(0.16)	(0.05)	(0.13)			
Maastricht deficit				–0.703***	–0.038	–0.744***
(percent of GDP),				(0.16	(0.07)	(0.15)
if deficit < 3%						
Maastricht deficit				0.809***	0.168*	0.641***
(percent of GDP),				(0.21	(0.08)	(0.23)
Δ if deficit ≥ 3%						
Dummy SGP	–0.007	0.477	–0.483	0.193	0.519***	–0.324
	(0.49)	(0.19)	(0.49)	(0.41)	(0.17)	(0.44)
Dummy	0.75*	–0.184	0.942**	–1.219*	–0.594***	–0.621
deficit ≥ 3%	(0.38)	(0.23)	(0.31)	(0.7)	(0.15)	(0.67)
Number of observations	191	191	191	191	191	191
R^2	0.48	0.24	0.52	0.54	0.26	0.57

Estimation method: two-stage least squares, fixed-effects panel. Standard errors are robust with respect to within-panels error correlation. The reported adjusted R square pertains to second-stage regressions. The Maastricht deficit is instrumented with its own lag, the lagged debt, and the lagged real GDP growth rate.
Coefficient standard errors are reported in parentheses. *, **, *** denote, respectively, statistics significant at the 90 per cent, 95 per cent and 99 per cent level.
The coefficients for the fixed effects and the constant term are not reported. The SGP dummy takes value 1 for euro-area countries after 1998. The 3 per cent dummy takes value 1 if the lagged value of the Maastricht deficit is above 3 per cent of GDP. The change in the Maastricht deficit coefficient due to deficits being above 3 per cent is computed as the coefficient of the Maastricht deficit times the 3 per cent dummy.

Table 5b

The Determinants of the Stock-flow Adjustment: Evidence from Regression Analysis
The Impact of Excessive Deficits – EU-25, 1994-2004

Dependent variables **Explanatory variables**	**Total SFA**	**"Hidden deficit" SFA (Differences between cash and accruals measures of deficit)**	**SFA related with accumulation of financial assets**	**"Hidden deficit" SFA (Differences between cash and accruals measures of deficit)**	
Specification		(1) Euro area, 1994-2004		(2) EU-25, 1994-2004, if lagged Maastricht deficit < 3%	(3) EU-25, 1994-2004, if lagged Maastricht deficit ≥ 3%
Lagged debt	–0.014	0.017	–0.030	0.038*	0.0008
(percent of GDP)	(0.01)	(.0.2)	(0.02)	(0.02)	(0.014)
Maastricht deficit *(percent of GDP)*, if deficit < 3%	–0.728***	–0.036	–0.690**		
	(0.22)	(0.09)	(0.24)		
Maastricht deficit *(percent of GDP)*, *Δ* if deficit ≥ 3%	1.040***	0.209*	0.828**		
	(0.25)	(0.11)	(0.29)		
Maastricht deficit *(percent of GDP)*, if no SGP				0.072	0.315***
				(0.14)	(0.109)
Maastricht deficit *(percent of GDP)*, *Δ* if SGP				–0.201*	–0.001
				(0.11)	(0.11)
Dummy SGP	0.838	0.420*	0.429	1.063***	0.333
	(0.60)	(0.22)	(0.55)	(0.26)	(0.38)
Dummy deficit ≥ 3%	–1.731*	–0.552*	–1.171		
	(0.886)	(0.26)	(0.909)		
Number of observations	110	110	110	106	85
R^2	0.57	0.29	0.58	0.28	0.38

Estimation method: two-stage least squares, fixed-effects panel. Standard errors are robust with respect to within-panels error correlation. The reported adjusted R square pertains to second-stage regressions. The Maastricht deficit is instrumented with its own lag, the lagged debt, and the lagged real GDP growth rate.
Coefficient standard errors are reported in parentheses. *, **, *** denote, respectively, statistics significant at the 90 per cent, 95 per cent and 99 per cent level.
The coefficients for the fixed effects and the constant term are not reported. The SGP dummy takes value 1 for euro-area countries after 1998. The 3 per cent dummy takes value 1 if the lagged value of the Maastricht deficit is above 3 per cent of GDP. The change in the Maastricht deficit coefficient due to deficits being above 3 per cent is computed as the coefficient of the Maastricht deficit times the 3 per cent dummy.

roughly nil if the deficit is below the Maastricht reference value, while it is significantly positive when the deficit is above. This finding reconciles the empirical evidence in Table 3 with the predictions from the model. On average, over the sample the deficit is equal to 3.6 per cent of GDP when the SGP variable is equal to zero (*i.e.*, before the SGP entered into force and for non-euro area countries) while the average value of the deficit when the SGP dummy equals 1 is 0.8 per cent. It would be enough to suppose that the weight give by fiscal authorities to the deficit objective (parameter θ_1) is larger when deficits are in excess of the Maastricht reference to explain both why the sensitivity of fiscal gimmicks to deficit is larger when deficits are above 3 per cent of GDP (Table 5a) and why when the SGP dummy takes value 1 the sensitivity of fiscal gimmicks is instead reduced (Table 3).

Table 5a also shows that the SFA associated with the accumulation of financial assets become less sensitive to the (lagged) deficit when deficits exceed 3 per cent of GDP. This finding could indicate that, when the priority for governments is to correct deficits in excess of the 3 per cent Maastricht reference value, less weight is given by fiscal authorities to the debt reduction objective per se (a lower parameter θ_2).

Further regression results confirming the above interpretation are displayed in Table 5b. Specification (1) repeats the same analysis as in Table 5a but limiting the sample to euro-area countries. The aim is disentangling whether it is mainly the behaviour of euro area countries during the run up to EMU that affects the result in Table 5a or rather that of non-euro area countries, and notably that of the countries that acceded to the EU in 2004. In specifications (2) and (3) the same estimates for the accounting gimmicks determinants as in specification (2) of Table 3 are repeated limiting the sample to observations for which the 3 per cent dummy is, respectively, 0 and 1. The objective in this case is controlling whether the fact that deficits are above or below the 3 per cent Maastricht ceiling actually contribute to explain the results for the basic specifications illustrated in Table 3 regarding the impact of the SGP on the sensitivity of accounting gimmicks with respect to deficits.

The estimates in Table 5b indicate that when limiting the analysis to euro area countries the results in Table 5a turn out being broadly confirmed. The evidence for euro-area countries does not appear to be radically different compared with that referring the sample of all EU25 countries. Results in specification (2) and (3) reveal that when deficits are in excess of the 3 per cent of GDP reference value the SGP does not affect the link between accounting gimmicks and the deficit, while this relation weakens with the SGP if deficits are below the Maastricht ceiling.

Overall, an interpretation of the interplay between the evolution of the EU fiscal framework and the incentives to carry out accounting gimmicks could be as follows: During the run-up to EMU and before the SGP entered into force, governments had an incentive to disguise their deficits only as long as their deficits exceeded the 3 per cent of GDP threshold, as their main endeavour was to qualify to the euro. A similar reasoning applies currently to the countries that acceded in 2004. Our econometric results show, consistently, that it is when deficit are above 3 per

cent that accounting gimmicks become sensitive to the size of the deficit. With the SGP, the respect of the 3 per cent reference value remains, but rather as an upper ceiling than a target. Since the frequency of deficits well above 3 per cent is lower after the introduction of the SGP, the link between fiscal gimmicks and deficit could be expected to weaken, as shown in our baseline results. However, our estimates also show that after the SGP there is a higher amount of SFA associable with accounting gimmicks, irrespective of the size of the deficit. This result could be explained by the medium-term commitment to reach a budgetary position of close to balance introduced with the SGP, which applies both to cases where the deficit is above or below the 3 per cent deficit threshold.

4.4 An alternative breakdown for the SFA

The results illustrated so far use a breakdown of the SFA which provides a comprehensive measure of financial operations but a rather partial measure of accounting gimmicks aimed at reducing the deficit. We therefore repeat the regressions presented in the baseline specifications using the comprehensive measure for hidden deficits discussed in Section 2.2. In this case, the financial operations that could be carried out by the government as an alternative to the provision of subsidies (*i.e.*, via loans and shares or other equities non-held by social security and unrelated to privatisation) are moved from financial operations which contribute to reduce the debt into the hidden deficit component. This finer decomposition has a large cost in terms of reduced data availability but permits to countercheck our main results.

Table 6 displays the results for regressions relating to the same baseline specifications as presented in Table 3. Although the loss of observations translates into a reduction in the degree of significance of the estimates the sign of the coefficients is the expected one and the results are qualitatively the same as those obtained with the breakdown adopted in the previous regressions. In particular, it is confirmed that the SFA components associable with hidden deficits increases significantly after the introduction of the SGP, while this is not the case for the remaining SFA. The comprehensive measure of "hidden deficits" used in the regressions in Table 6 is the sum of differences between cash and accrual and of accumulation of assets that could represent disguised government subsidies. By repeating the analysis using only this second component as dependent variable, regression coefficients appear largely statistically insignificant. This suggests that the results obtained with the comprehensive measure of "hidden deficits" are mainly due to the difference between cash and accrual.

4.5 Summarising the empirical results

The main messages from the empirical results presented above can be summarised as follows.

Table 6

The Determinants of the Stock-flow Adjustment: Evidence from Regression Analysis
An Alternative Breakdown of SFA, Baseline Specifications – EU-25, 1994-2004

Dependent variables **Explanatory variables**	**Total SFA**	**"Hidden deficit" SFA, comprehensive proxy** **(A)**	**"Hidden deficit" SFA unrelated with differences between cash and accrual** **(B)**	**SFA related with accumulation of other financial assets** **(C)**	**Total SFA**	**"Hidden deficit" SFA, comprehensive proxy** **(A)**	**"Hidden deficit" SFA unrelated with differences between cash and accrual** **(B)**	**SFA related with accumulation of other financial assets** **(C)**
Specification			(1)				(2)	
Lagged debt	–0.079**	0.002	–0.005	–0.082*	–0.081**	0.002	–0.005	–0.083*
(percent of GDP)	(0.02)	(0.01)	(0.018)	(0.04)	(0.03)	(0.19)	(0.017)	(0.04)
Maastricht deficit	–0.182	0.058	–0.045	–0.241				
(percent of GDP)	(0.17)	(0.08)	(0.10)	(0.15)				
Maastricht deficit					–0.010	0.117	–0.062	–0.127
(percent of GDP), without SGP					(0.13)	(0.09)	(0.09)	(0.14)
Maastricht deficit					0.447*	–0.152	0.023	–0.295
(percent of GDP) change due to SGP					(0.25)	(0.11)	(0.28)	(0.20)
Dummy SGP	0.234	0.618**	0.102	–0.383	1.031	0.889**	0.023	0.142
	(0.56)	(0.28)	(0.91)	(0.56)	(0.79)	(0.28)	(0.28)	(0.75)
Number of observations	166	166	166	166	166	166	166	166
R^2	0.50	0.33	0.24	0.52	0.52	0.34	0.25	0.53

Estimation method: two-stage least squares, fixed-effects panel. Standard errors are robust with respect to within-panels error correlation. The Maastricht deficit is instrumented with its own lag, the lagged debt, and the lagged real GDP growth rate.
Coefficient standard errors are reported in parentheses. *, **, *** denote, respectively, statistics significant at the 90 per cent, 95 per cent and 99 per cent level. The coefficients for the fixed effects and the constant term are not reported. The SGP dummy takes value 1 for euro-area countries after 1997. The change in the Maastricht deficit coefficient due to the SGP is computed as the coefficient of the Maastricht deficit times the SGP dummy.

(A) = sum of (i): differences in the recording of revenue and primary expenditure (accounts receivable and payable) and statistical discrepancies; (ii) accumulation of government loans; (iii) accumulation of shares and other equities not held by social security and non related to privatisations.
(B) = (A) – (ii) – (iii)
(C) = accumulation of following assets by government: (i) liquidities; (ii) securities other than shares; (iii) shares held by social security; (iv) shares related to privatisation.

i) The overall SFA appears to be negatively related (yet not significantly) to deficits. However, the aggregate SFA masks relevant differences for different SFA components. While the relation is positive for the hidden deficit component, it is negative for financial operations.

ii) The level of the debt has also a different impact on different SFA components: not significant for hidden deficits, negative for the accumulation of financial assets.

iii) The introduction of the SGP raises significantly the accounting gimmicks components of the SFA. However, the relation between accounting gimmicks and deficits appears to get weaker after the SGP.

iv) Accounting gimmicks are unaffected by deficits below the 3 per cent ceiling, but increase strongly with deficits when these are above the Maastricht threshold.

v) Elections affect positively all SFA components.

Result *i* permits to better qualify findings already reported in Von Hagen and Wolff (2005). The authors attribute the negative relation of the SFA to deficits mainly to creative accounting related to a strategic use of financial operations (e.g., disguised subsidies accounted for as stock acquisitions by government). Our analysis permit to disentangle different SFA components and indicates that the negative relation between the SFA and deficits can be mainly associated with financial operations, while the relation between deficits and the SFA component more strictly associable with hidden deficits is on average positive. The model presented in this paper can provide an explanation to these findings. The hidden deficits are positively related to deficits because the higher the deficit, the stronger the incentive to engage in creative accounting. Financial operations are instead negatively related because their purpose is to contain the growth of the debt. The same qualitative result is obtained by using a finer breakdown of the SFA which recognises that a number of financial transactions (e.g., hidden subsidies) may also be used to hide expenditure.

The presence of the SGP is associated with significantly more hidden deficits irrespective of the deficit level (as reflected in the significant value of the SGP dummy both in the regressions for EU 25 and EU 12 countries), while the presence of excessive deficits increases the sensitivity of accounting gimmicks to deficits (results *iii* and *iv*). These results are consistent with existing findings pointing to a positive effect of deficits above the Maastricht threshold on the probability of carrying out accounting tricks and one-off operations (Koen and Van den Noord, 2006).

Finally, we learn from result *v* that elections matter for the SFA, controlling for other determinants. The fact that in the current year general elections take place affects positively all SFA components. The positive coefficient for hidden deficits fits with the interpretation that creative accounting and a lower degree of fiscal transparency enhance the capacity of governments to put in place electoral cycles, as for instance recently highlighted empirically in Alt and Lassen (2005). On the other hand, the positive and significant coefficient in the case of financial operations is of

a less obvious reading. Among the interpretation there is that under elections governments have less incentives to prepare large privatisations.

5. Conclusions

The aim of this paper was to study how the budgetary rules of EMU give rise to political incentives for manipulating fiscal variables with the purpose of hiding deficits and reduce gross debt. We show both theoretically and empirically that such powerful incentives were at work during the run-up and in the early years of EMU. Governments used a number of operations to conceal the true size of their deficits and put in place financial operations to stem the increase in the public debt. The former increased in importance after the advent of the SGP, which shifted the focus of policy surveillance on deficits with initially scant attention to the means used to ensure the respect of the deficit rule and little weight to the debt rule. As predicted by our model, increased weight to the deficit criterion in EU surveillance resulted into lower Maastricht deficits but also into a higher incidence of stock-flow adjustments potentially connected with accounting tricks to keep Maastricht deficits low. We show that such incentives were reinforced in electoral periods.

In the recent reform of the Stability and Growth Pact, more emphasis is put on the debt rule and, more generally, on long-term sustainability, and on the need to ensure a durable correction in the excessive deficit via structural adjustment. In our analysis, a stronger emphasis on the debt would reduce deficits under most likely conditions.[23] However, such shift in focus may induce governments to carry out more sales of financial assets. To prevent this, as suggested, for instance, by Easterly (1999) and Coeuré and Pisany-Ferry (2005), fiscal surveillance oriented on a comprehensive notion of government assets and liabilities (net debt) would contribute to reduce the incentives to decumulate assets to reduce the gross debt and, indirectly to keep deficit and debt low. A higher attention to structural adjustment implies an increase in the political cost of deficit-reducing one-off operations and would reduce the incidence of accounting tricks. In the same direction goes the call for increased statistical transparency – as required by the reformed SGP – fostered by a public opinion becoming more adverse to fiscal gimmicks.[24] The shift to a more comprehensive fiscal surveillance based on multiple indicators may help to reduce the incentives to data manipulations (see, e.g., Balassone *et al.*, 2005).

While the empirical analysis carried out in this paper appears robust and the results largely consistent with those in the literature, several avenue for further research can be pursued. First, SFA components do not capture all the means throughout which governments can manipulate fiscal variables. For instance,

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[23] On the reform of the SGP, see Buti *et al.* (2005), Buti (2006) and European Commission (2005 and 2006).

[24] There is anecdotal evidence pointing to a higher perceived cost of creative accounting activities. Not only EU authorities are putting greater focus on statistical transparency, but also financial markets and credit agencies are increasingly aware of the long-term consequences for public finances of window dressing activities (see, e.g., "EU securitisation may have passed peak", *Financial Times*, 7 December 2005).

operations that allow cashing an immediate receipt in exchange for higher pension liabilities, sales of real estate, as well as other one-off revenues do not have affect any SFA component. A comprehensive analysis should integrate the three research approaches recalled in the introduction (bottom up identification of tricks, balance sheet and analysis of SFA components). Second, in the implementation of the EU fiscal rules, the first outcomes are the figures that really matter, though revisions in deficit, debt and SFA components are frequent. Though large revisions may be detrimental for the credibility of the concerned member states (notably Portugal in 2002, Italy in 2005 and especially Greece in 2004) and of the SGP itself, data revisions are relatively irrelevant for the implementation of the Pact. Therefore, governments have a specific interest in portraying healthy public finances in the first deficit notification, even if the data are subsequently revised upwards. In order to capture more effective the political incentives to manipulate fiscal accounting, one should use real-time SFA.[25] We conjecture that the repetition of our empirical analysis in real-time data would confirm, and reinforce, our conclusions.

[25] See, e.g. Forni and Momigliano (2005) for an analysis of fiscal behavior using real time output gaps.

APPENDIX 1
DERIVING THE *X*(*Z*) AND THE *Z*(*X*) SCHEDULES (FIGURE 4)

From the first order conditions for the minimization of the loss function (5) with respect to d, the deficit d can be expressed as a function of x and z as follows:

$$d = \frac{\phi\,\hat{y} + \theta_1 x + \theta_2(1-\phi\,b)[z-\alpha(b-\bar{b})]}{\phi^2 + \theta_1 + \theta_2(1-\phi\,b)^2} \tag{9}$$

Plugging (9) into the solution of x in terms of d (expression (6)), below the line operations x are obtained as a function of financial stock-flow operations in the following way:

$$x = \frac{\theta_1[\phi\,\hat{y} + \theta_2(1-\phi\,b)(z-\alpha(b-\bar{b})]}{(\theta_1+\theta_3)[\phi^2 + \theta_1 + \theta_2(1-\phi\,b)^2] - \theta_1^2} \tag{10}$$

Finally, substituting (9) into equation (7), financial operations z can be expressed as a function of x in the following way:

$$\begin{aligned} z = {} & \frac{\theta_2[\phi^2 + \theta_1 + \theta_2(1-\phi\,b)^2]}{(\theta_2+\theta_4)[\phi^2 + \theta_1 + \theta_2(1-\phi\,b)^2] - \theta_2^2(1-\phi\,b)^2} \times \\ & \times \frac{\alpha(b-\bar{b})[\phi^2 + \theta_1 + \theta_2(1-\phi\,b)^2]^{-1}(1-\phi\,b)[\phi\,\hat{y} + \theta_1 x - \theta_2(1-\phi\,b)\,\alpha(b-\bar{b})]}{(\theta_2+\theta_4)[\phi^2 + \theta_1 + \theta_2(1-\phi\,b)^2] - \theta_2^2(1-\phi\,b)^2} \end{aligned} \tag{11}$$

Equations (10) and (11) can be represented graphically as in Figure 4. Under the condition that $\phi\,b<1$ both functions are linear and upward sloping. As for the relative sloped of $x(z)$ and $z(x)$, one checks that $\frac{\partial x}{\partial z}_{x(z)} > \frac{\partial x}{\partial z}_{z(x)}$ if and only if:

$$\theta_2(1-\phi\,b)^2[(\theta_2+\theta_4)Q - \theta_2^2(1-\phi\,b)^2] > Q^2\left(\frac{1}{\theta_1} + \frac{\theta_2}{\theta_1^2}\right) - Q \tag{12}$$

where $Q = \phi + \theta_1 + \theta_2(1-\phi b)^2$. It is evident form (12) that a sufficiently small θ_2 guarantees $\frac{\partial x}{\partial z}_{x(z)} > \frac{\partial x}{\partial z}_{z(x)}$.

The inspection of equations (11) and (12) is sufficient to establish that the $x(z)$ schedule moves upward and that the $z(x)$ schedule moves downward in the (x, z) space. It is also easily established that both the schedules move downward when the debt rule becomes more stringent, namely, α rises. Less straightforwardly, it can bed shown that the same move in the loci occurs when the debt target becomes more ambitious (*i.e.*, $\bar{b}$ falls). Indeed, while the $x(z)$ schedule clearly falls, the case of the $z(x)$ is not clear-cut since z rises directly as a result of a fall in $\bar{b}$ but falls via the associated reduction in d. It is checked that the first effect always prevails.

APPENDIX 2
COMPARATIVE STATICS

After plugging (8) into (6) and (7) it is possible to perform comparative statics of the solutions for x and z with respect to model parameters.

- $\hat{y}$: By simple inspection of (8) one checks that an increase in $\hat{y}$ leads to a higher d and then, by (6) and (7), to higher x and z.
- α: α lowers d, thus causing a reduction in x. As for z, the impact is *a priori* ambiguous (z rises directly, but falls through d). Comparative statics analysis shows that the previous effect prevails, *i.e.*, $z^*_\alpha + z^*_d \frac{\partial d}{\partial \alpha} > 0$, so that $\frac{\partial z^*}{\partial \alpha} > 0$.

  The debt target $\bar{b}$ has the same impact as parameter α.
- b: The derivative of d with respect to b is ambiguous. Indeed, after some manipulations it is obtained $\frac{\partial d^*}{\partial b} > 0$ if and only if $\frac{\alpha(1-\phi(b-\bar{b})-\phi b)}{2\phi(1-\phi b)} < d*$, which may or may not be the case. This implies an ambiguous impact of b on x. It is checked that there is also an ambiguous of b on z.
- θ_1: Parameter θ_1 affects negatively d. It has therefore a negative impact on z. Regarding x, its value increases for any given d. This effect needs to be weighted against the negative impact that θ_1 has on d. It can be shown that $x^*_{\theta_1} + x^*_d \frac{\partial d}{\partial \theta_1} > 0$ the direct positive effect always prevails, so that $\frac{\partial x^*}{\partial \theta_1} > 0$.
- θ_2: If $d > 0$, (*i.e.*, if the "true" budget balance records a deficit), the impact of parameter θ_2 on d is negative, since it reduces the numerator and increases the denominator. It follows that the impact of θ_2 on x is negative. Regarding the impact on z it is ambiguous, since θ_2 directly raises z while the reduction in d lowers it.
- θ_3: An increase in θ_3 would have a double negative impact on x, both directly and indirectly, via a lower value for d. The impact on z would only be indirect, and negative.
- θ_4: If $d > 0$, a higher value for θ_4 would reduce d and therefore x and, both directly and indirectly z.

Table 7 presents in synthetic form the results illustrated above.

Table 7

Political Incentives under Numerical Rules: A Simple Model
Main Results from Comparative Statics

	Impact on deficit (*d*)	**Impact on "hidden deficit" (*x*)**	**Impact on financial operations (*z*)**
Growth objective ($\hat{y}$)	+	+	+
Pace of debt reduction (α), debt target ($\bar{b}$)	–	–	+
Debt level (b)	?	?	?
Political cost of deficit (θ_1)	–	+	–
Political cost of debt (θ_2)	–	–	?
Political cost of "hidden deficit" (θ_3)	–	–	–
Political cost of "financial operations" (θ_4)	–	–	–

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