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WORKING PAPER SERIES

NO 1114 / NOVEMBER 2009

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REVENUE WINDFALLS
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AN ANALYSIS FOR
SELECTED EU
COUNTRIES**

by Richard Morris, Claudia
Rodrigues Braz, Francisco de Castro,
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AN ANALYSIS FOR SELECTED EU COUNTRIES¹

by Richard Morris², Claudia Rodrigues Braz³,
Francisco de Castro⁴, Steven Jonk⁵,
Jana Kremer⁶, Suzanne Linehan⁷,
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Abstract

In recent years, government revenues in many EU countries experienced significant and erratic changes, which, a priori, could not be fully explained by macroeconomic developments or by discretionary fiscal policy measures. We investigate this issue by estimating “unexplained” changes in tax and social contribution revenues, based on proxies for tax revenue bases and elasticities commonly used for forecasting or cyclically adjusting government revenues and taking into account estimates of the impact of legislation changes. This is done for a selection of EU countries, including the “big five” euro area countries (Germany, Spain, France, Italy and the Netherlands) together with Ireland, Latvia and Portugal. We also undertake the same exercise using alternative tax base proxies, either taken from forecasting models or on the basis of our knowledge of the tax system in each country. The results show that, in the aggregate, revenue windfalls and shortfalls have exhibited a broadly cyclical pattern, driven mainly by developments in profit-related taxes and, to a somewhat lesser extent, VAT. Other, more structural factors also play a role, such as declining consumption of fuel and tobacco, as well as factors specific to individual countries, such as developments in property markets. The estimated revenue windfalls and shortfalls can explain a substantial proportion of changes in the euro area cyclically adjusted budget balance over the period 1999-2007. Since these unexplained revenue changes have exhibited a largely cyclical character and might therefore be viewed as partly temporary, this highlights the importance of a careful interpretation of fiscal indicators adjusted for the economic cycle. Except in a small number of cases, the results do not change significantly when alternative tax base proxies are used, suggesting that the potential for improving existing indicators by a better matching of taxes to their bases is likely to be limited.

Keywords: Tax revenues, fiscal forecasting, cyclical adjustment

JEL Classification: H20, H68, E62

Non-technical Summary

In recent years, government revenues in many EU countries experienced significant and erratic changes, which, a priori, could not be fully explained by macroeconomic developments or by discretionary fiscal policy measures. Understanding the origins of such revenue “windfalls” and “shortfalls” is essential for fiscal analysis and in particular the assessment of countries' underlying fiscal positions.

We investigate this issue by estimating “unexplained” changes in tax and social contribution revenues for a selection of EU countries, including the “big five” euro area countries (Germany, Spain, France, Italy and the Netherlands) as well as Ireland, Latvia and Portugal for a period extending from 1998/99 to 2007. The basic principle underlying our approach is that receipts from a particular revenue category (e.g. VAT) in a given year can be estimated on the basis of (i) the level of receipts in the previous year, (ii) the growth rate of some variable which proxies for the tax base (e.g. private consumption), (iii) an estimated or assumed elasticity of the tax with respect to its base (reflecting the progressivity or regressivity of the tax) and (iv) the estimated impact of any discretionary measures (e.g. a cut in the tax rate). The difference between the actually observed level of tax receipts and the estimated level is the “unexplained change” or model “residual” and is our estimate of the revenue windfall or shortfall.

In this paper we present two sets of estimates. The first is based on a standardised set of tax base proxies. These (roughly) correspond to those used within the European System of Central Banks in the context of adjusting the budget balance for the impact of the economic cycle. These estimates can be interpreted as measuring the extent to which revenue developments that are not attributed to discretionary policy measures or changes in the structure of GDP growth nonetheless give rise to changes in the cyclically adjusted budget balance. The second set of estimates is based on an alternative (more refined) set of tax base proxies either taken from currently employed forecasting models or chosen on the basis of our knowledge of the tax system in each country. A major value added of our analysis is that - for both sets of estimates - we present a much more detailed breakdown of revenues than is typical in multi-country analysis. This can shed important light on the main sources of revenue windfalls and shortfalls. Moreover, by comparing the two sets of estimates we can observe whether the use of alternative tax base proxies helps to “explain away” the residuals. If this would be the case, this would suggest that there is potential to improve existing fiscal analysis, including methods of computing the cyclically adjusted budget balance, by better matching tax revenues to available tax base proxies.

Turning to our results, the estimates based on the standardised tax base proxies show that, for the period analysed, revenue windfalls and shortfalls overall have tended to exhibit a cyclical pattern. Notably, for an aggregate of the five largest euro area countries (Germany, Spain, France, Italy and the Netherlands) revenue windfalls occurred in the upturns of 1999-2000 and 2004-2007 and revenue shortfalls during the downturn of 2001-2003. These windfalls and shortfalls were mainly due to the development of profit-related taxes. These include not only corporate income taxes, but also taxes paid by households (including unincorporated firms) on their profits and capital income as well as taxes on production recorded as indirect taxes (in particular local business taxes). Two factors are generally seen as driving the observed windfalls and shortfalls in profit-related taxes. The first factor relates to the well known leads and lags in tax collection and, more generally, the complex nature of business taxation, which drives a significant wedge between the actual tax base and national accounts measures of profits. The second factor relates to “extraordinary” profits (e.g. capital gains) and losses (leading e.g. to write-offs on corporate balance sheets). While less significant, unexplained changes in VAT also tend to exhibit a somewhat cyclical pattern, which is at least partly related to changing consumption patterns. Other, more structural factors also play a role. Notably there have been cumulative shortfalls in excise duties on fuel, tobacco, and alcohol again reflecting changing consumption habits. While not a major factor in most countries, in Ireland and Spain developments in the housing market were a major factor contributing to an exceptional buoyancy of tax receipts over the period considered.

Our estimates based on the alternative set of tax base proxies help to at least partly explain away revenue windfalls and shortfalls in some cases. This is true notably for excise duties on fuel, tobacco and alcohol, the residuals for which can be reduced significantly if - for example - consumption of these goods replace overall private consumption as the tax base proxy. Moreover, unexplained changes in VAT, property transfer and stamp duty taxes in Ireland and Spain are reduced somewhat if the standard tax base proxy, private consumption, is augmented (in the case of VAT) or replaced (in the case of property transfer and stamp duty taxes) by data on residential investment or house purchases. Overall, however, the estimates based on the alternative set of tax bases do not give rise to significantly different results in the aggregate. There are essentially two main reasons for this. The first is that there is no available macroeconomic aggregate that comes anywhere near explaining the observed short-term fluctuations in profit-related taxes. The second is that, if residuals for different revenue categories offset each other, being able to better explain developments in a sub-set of taxes may give rise to larger residuals in the aggregate.

From a policy perspective, our analysis poses some interesting questions and difficult challenges. Firstly, it implies that indicators commonly used to measure the fiscal stance or fiscal consolidation efforts such as the change in the cyclically adjusted primary balance or the structural balance may be misleading if interpreted too narrowly. One should not “simply” equate the change in the cyclically adjusted primary balance (or the structural primary balance) with discretionary fiscal policy.

Secondly, it raises the question of whether existing procedures for forecasting and cyclically adjusting tax revenues could be further enhanced. In this respect, especially in the case of a disaggregated cyclical adjustment methodology such as that employed within the ESCB, there may be some “quick wins” in the sense of a better matching of tax revenues to their bases. However, our results highlight the fact that a significant improvement in these measures will not be achieved unless the issue of fluctuations in profit-related taxes is adequately addressed. In view of the underlying causes of these fluctuations, this is easier said than done.

Thirdly, one might ask whether governments - to the extent that they are concerned by excessive fluctuations in tax revenues - might have an interest to seek to reduce such fluctuations by reforming the tax system. Generally speaking, more proportionate taxes (with fewer allowances etc) might generate fewer surprises. But clearly there are much broader issues of equity and efficiency which have to be borne in mind in the design of the tax system. For example, the possibility for firms to carry forward their losses for tax purposes would seem to be an important component of a growth enhancing tax system. Generally - and given the high uncertainty surrounding the budgetary impact of changes in tax legislation - a more straight forward approach to decreasing surprises and enhancing stability might be a more medium-term focused tax policy aiming at achieving a stable tax system, while avoiding frequent legislation changes to reach short-term policy goals.

1. Introduction

In the years 2005-2007, fiscal positions in most EU countries improved significantly. The general government deficit of the euro area declined from around 3% to just 0.6% of GDP. France, Italy, Portugal and Germany all corrected excessive deficits, the latter also achieving a balanced budget. This development was aided not only by the broadly favourable cyclical conditions prevailing at the time, but also by exceptionally buoyant revenue growth, going beyond what would normally be expected merely in light of the pick-up in economic growth. Given that such "revenue windfalls" also drive down structural deficits (i.e. deficits adjusted for the estimated impact of the economic cycle and temporary measures), understanding their origins is essential for assessing the underlying improvement of countries' fiscal positions and the risk of a turnaround (i.e. revenue shortfalls) in the event of an economic downturn or recession, as is happening at the time of writing. As the European Commission noted in its report on Public Finances in EMU 2007:

"...the estimates of the structural deficit are likely to be affected by the exceptionally high tax content of economic activity... Since the buoyancy of tax revenues may reflect both permanent and temporary factors, the verdict is still out on the actual determinants of the estimated improvement of the structural budget balance."

There are many potential drivers of revenue windfalls and shortfalls, including developments in asset markets, leads and lags in tax collection, improved tax compliance, consumption shifting, (oil) prices developments, and so on. This paper aims to shed some light on the relative importance of these factors by providing a relatively detailed analysis of revenue developments for a selection of EU Member States (Germany, Ireland, Spain, France, Italy, Latvia, the Netherlands and Portugal) since the end of the 1990s. The paper is structured as follows. Section 2 addresses issues of definition and measurement. Section 3 provides an overview of the results of our analysis. Section 4 makes some concluding remarks. More detailed country-by-country analysis is provided in Section 5.

2. Defining and measuring revenue windfalls and shortfalls

2.1. "Unexpected" versus "unexplained" changes in revenues

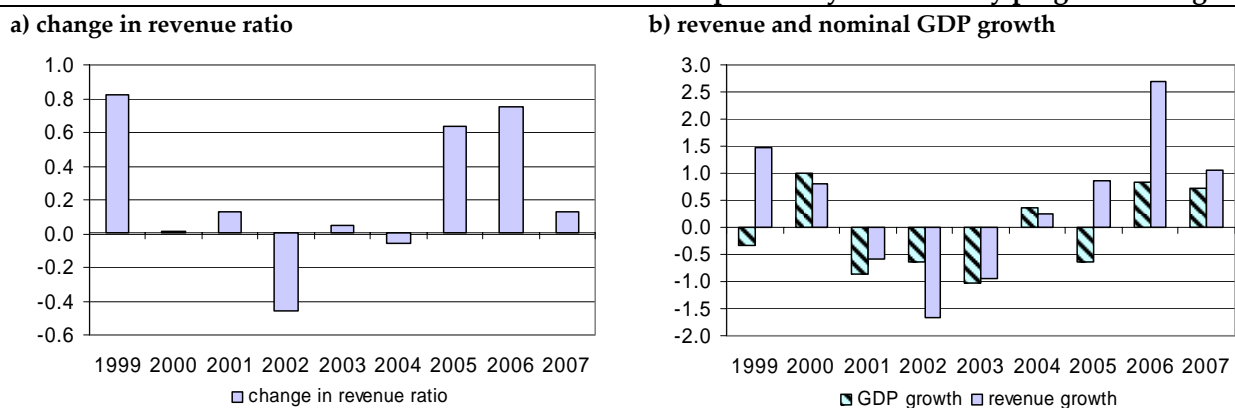
The Oxford dictionary defines a windfall as "*an unexpected piece of good fortune*" and for many EU governments the largely unexpected buoyancy of tax revenues in 2005-2007 can certainly be described in these terms. While the term revenue windfall or shortfall has come to be used more and more frequently in fiscal analysis in recent years, a common approach to measurement does not exist.

In practice the term windfall (shortfall) is often used to refer to *unexpected* revenue gains (losses), in the sense of revenues that exceed (fall short of) initially projected levels. For example, one can measure revenue windfalls or shortfalls in terms of the difference between the actual revenue intake and the level forecast by the government in its budget or in its stability or convergence programme (see, for example, Moulin and Wiertz (2007), European Commission (2008), or ECB (2008)). Panel a of Chart 1 reports the difference between the actual changes in the euro area general government revenue ratio and that projected on the basis of the targets set in euro area Member States stability programmes of the preceding year over the 1999-2007 period.² On this basis, there appear to have been large revenue windfalls (of more than 0.5% of GDP) in 1999 and then again in 2005 and 2006, while there was a significant revenue shortfall of almost 0.5% of GDP in 2002.

² "Euro area 12" composition, i.e. excluding Slovenia, Cyprus, Malta and Slovakia.

Such unexpected changes in revenues can be computed relatively easily on the basis of published information. However, measuring revenue windfalls in this way also has its limitations. Firstly, differences between actual and budgeted revenues may be explained by unexpected macroeconomic developments; although if one assumes that tax revenues would normally grow broadly in line with overall output, this should not matter much for changes in the revenue-to-GDP ratio.³ As panel b of Chart 1 shows, deviations of revenue growth from the levels projected in the stability programmes are generally correlated with errors in the projection for nominal GDP growth. But this is not the case in all years. For example, revenue growth in 1999 and 2005 was higher than projected, in spite of lower than forecast GDP growth, while in 2006 the higher than expected GDP growth can only explain a small part of the additional revenues in that year. Secondly, comparing actual and projected outcomes implies that any corrective measures taken after the budget was adopted are ignored⁴ as are base year effects, in case outcomes in the base year turn out to be different from what was assumed in the budget or stability/convergence programme. Thirdly, official budgetary projections may suffer from a political bias. Such a bias may reflect, on the one hand, a government's desire for prudence in its projection, or, on the other hand, an attempt to draw a too positive picture of public finances by over-estimating the impact of revenue-raising measures or economic growth. The fact that Chart 1 points to more windfalls than shortfalls suggests that, at least in the aggregate, euro area governments' may have tended towards prudence in their revenue forecasts (or they just got lucky).⁵ Fourthly, the comparison of targets and outcomes tells us nothing about the origins of the revenue windfall or shortfall, which may be due to changes in the composition of economic growth, or many other factors.

Chart 1: Euro area: differences between outcomes and the previous year's stability programme targets



Sources: Stability programmes, European Commission, ECB.

In this paper we adopt an alternative approach of measuring revenue windfalls and shortfalls as the "unexplained" change in revenues. By unexplained, we mean the difference between actual revenues and the level that would be predicted on the basis of a standard forecast model. More specifically, a projection of receipts for any particular revenue item in period t can be made on the basis of the following:

- (i) the observed level of revenues in the previous period, $t-1$: R_{t-1} ,

³ In terms of ratios to GDP, an unexpected lower or higher economic growth will usually affect mainly the government expenditure ratio since government expenditure is mostly exogenous (i.e. independent of other macroeconomic developments). By contrast, government revenues generally fluctuate in line with economic activity, so the revenue-to-GDP ratio is much less affected by changes in economic growth.

⁴ Even though this problem should be relatively limited if projections for year t from the end of year $t-1$ are analysed.

⁵ NB: The average under projection of revenues does not seem to be matched by similar under projection of nominal GDP growth.

- (ii) the growth rates in periods $t, \dots, t-n$ of a macroeconomic variable which is taken as a proxy for the tax base⁶, where the growth rates in earlier periods are considered in case revenues are collected with time lags of 1 to n periods: $b_{t,0}, \dots, b_{t,n}$,
- (iii) the assumed elasticity of revenues with respect to the base (both contemporaneously and lagged if relevant): $\varepsilon_0, \dots, \varepsilon_n$, and
- (iv) the estimated impact of any legislative measures (e.g. changes to tax rates): m_t

In this case the unexplained change in revenues (revenue windfall/shortfall) r in period t is equal to the model residual, i.e. it is given by the formula:⁷

$$r_t = R_t - [R_{t-1} \cdot (\varepsilon_0 \cdot b_{t,0} + \dots + \varepsilon_n \cdot b_{t,n}) + m_t]$$

In the rest of this paper we use the terms "revenue windfall/shortfall", "unexplained change" and "residual" interchangeably.

2.2. The relevance of revenue windfalls and shortfalls according to the employed concept

Generally, the estimates of the revenue windfalls and shortfalls according to this concept are a measure of how well our underlying model approximates reality. On the one hand, windfalls and shortfalls occur since the models generally aim at capturing regular, average relationships between government receipts and the respective tax bases, while irregular developments have to be explained on a case-by-case basis. In the context of a revenue forecast, such irregular components are usually incorporated using expert judgment. This is often difficult and, therefore, revenue surprises (or, more technically speaking, forecast errors) and windfalls/shortfalls according to the proposed concept often coincide (see also Chart DE 2 in section 5.1). On the other hand, if revenue windfalls/shortfalls display a systematic pattern, this may be an indication that the model itself is not well specified. In this sense, our approach may help to identify and quantify the general estimation problem in the context of revenue forecasts. Furthermore, our approach allows us to provide a measure of revenue changes that do not seem to be related to discretionary fiscal policy action and to overall macroeconomic developments, including those that are not attributed to cyclical developments on the basis of standard cyclical adjustment methodologies.⁸ These revenue changes give rise to changes in the structural budget balance, even though they may be of a cyclical or transitory nature.

More specifically, factors leading to model residuals might be the following. Firstly, the variable selected to proxy the tax base does not usually coincide with the "true" base (we will say more about this below).

⁶ We use the term "tax base" in this paper also when referring to the base for social contributions, even though the latter are sometimes not considered to be taxes in the narrow sense of the word.

⁷ In some cases, the estimate may be based on a revenue series in which the impact of temporary measures / factors f_t are deducted from the outset (rather than deducted as part of m_t). In this case the formula becomes

$$r_t = (R_t - f_t) - [(R_{t-1} - f_{t-1}) \cdot (\varepsilon_0 \cdot b_{t,0} + \dots + \varepsilon_n \cdot b_{t,n}) + m_t]$$

⁸ In the ESCB method of cyclical adjustment the impact of "composition effects" stemming specifically from different growth rates of the macroeconomic base variables (employment, average compensation of employees, operating surplus and private consumption) are taken into account when computing the cyclical component. In the OECD/Commission approach based on an aggregated output gap, such changes in the composition of output growth are ignored and may therefore give rise to changes in the cyclically adjusted budget balance (see Mohr and Morris (2007) for a discussion of this point).

Secondly, the employed elasticity:⁹ in case the elasticity is under-estimated, and assuming a positive growth rate of the tax base proxy, there will be a tendency to observe revenue windfalls (according to our concept) and vice-versa. This may be the case, for example, if the elasticity does not fully capture the progressivity of the tax schedule and the associated “bracket creep”. Persistent revenue windfalls (shortfalls) may therefore be an indication that the employed elasticity needs to be revisited. Thirdly, the actual impact of legislative changes on revenues may be different from that assumed. Except in the case of relatively straightforward changes in tax rates, assessing the impact of policy measures is a notoriously difficult task. Official estimates may or may not be provided in national budget documents and may or may not be deemed reliable for the political bias reasons mentioned above. In case of major tax reforms or changes to complex tax credits and allowances, the assessment may boil down to little more than guesswork. While discussing such problems is not the main focus of this paper, these caveats should be borne in mind. In general one should be particularly cautious about interpreting estimated windfalls or shortfalls in years when revenues have been affected by important changes to the tax code.

2.3. The selection of proxies for the tax bases

An important focus of our analysis is on unexplained changes in revenues caused by mis-matches between the variables selected as proxies for the tax bases and the “true” (but unobservable) bases on which taxes and social contributions are actually accrued. In this regard, the estimates reported in this paper are based on two broad approaches.

A first set of estimates are based on the macroeconomic variables typically used as proxies for the bases of direct and indirect taxes and social contributions for the purpose of cyclical adjustment of the budget balance within the European System of Central Banks (see Bouthevillain et al (2001)). They are also, generally, the tax bases employed when using the “disaggregated framework for the analysis of structural developments in public finances” (henceforth “disaggregated framework”), which is a tool used for fiscal analysis in the ESCB (see Kremer et al (2006)). The latter breaks government revenue developments down into four components according to the estimated impact of (i) fiscal drag (sometimes also called bracket creep), (ii) the decoupling of the tax base from GDP; (iii) legislative changes (i.e. changes to the tax code) and (iv) an unexplained residual.¹⁰ The windfalls/shortfalls in this paper are conceptually the same as the residuals in the disaggregated framework.

The macroeconomic variables that are used as proxies for the tax bases for the purposes of cyclical adjustment are relatively common across institutions (see Girouard and André (2005) as regards the OECD/European Commission methodology and Bouthevillain et al (2001) as regards the ESCB methodology). In both approaches, direct taxes paid by households and social contributions are assumed to be determined by developments in the wage bill (i.e. compensation of employees). More specifically, in the ESCB cyclical adjustment methodology, direct taxes paid by households are assumed to depend, firstly, on the growth of employment (typically with a unit elasticity) and, secondly, on the growth of average compensation of employees, with an elasticity usually somewhat greater than one reflecting the progressivity of most personal income tax regimes. Receipts from direct taxes paid by corporations (or taxes on profits and capital income more generally) are normally assumed to depend on the growth of the (gross or net) operating surplus, which is the main national accounts proxy for corporate profits. This

⁹ Elasticities may be derived on the basis of the tax code or estimated econometrically (see Bouthevillain et al (2001) for a description). Elasticities are difficult to estimate in practice and sometimes a unit elasticity may simply be assumed (e.g. in the OECD method for computing cyclically adjusted balances, a unit elasticity for indirect taxes with respect to private consumption is assumed (see Girouard and André (2005))).

¹⁰ The disaggregated framework methodology does not impose a pre-defined selection of proxies for the tax bases. However, within the ESCB, the framework is implemented in a relatively standardised way mirroring that followed for cyclical adjustment, which serves the interest of transparency and comparability across countries.

may also include the "mixed income" of households if taxes paid by unincorporated business are included in this tax heading. Indirect taxes are assumed to depend on developments in private consumption, reflecting the fact that most indirect taxes, such as VAT and excise duties are predominantly taxes on private consumption expenditure.¹¹

Residuals arise often because the macroeconomic variables underlying cyclical adjustment and forecasting models are at best only rather rough proxies for the actual tax bases. For example, households pay taxes not only on their wage income but also on their interest income, any dividends they receive or realised capital gains, any profits they make if they run a small business, and so on. They may also benefit from various tax credits and allowances (e.g. child allowance). Methods used to project tax revenues may be based on a more elaborate information set aimed at capturing at least some of these more complex features of the tax system. Indeed, one would generally presume this to be the case for official government forecasts, and also within the ESCB some National Central Banks employ somewhat more sophisticated projection methods.¹² Furthermore, *ex post*, additional information (for example on the development of differently taxed consumption components) becomes available, that is not available at the time forecasts are made. Reflecting this, in this paper also a second set of estimates is provided, employing alternative (where possible more refined) proxies for the tax base. The latter may reflect either existing forecasting practices or, simply, the judgement of the respective fiscal analyst.

The alternative estimates may provide a clearer picture or additional information in the sense of helping to "explain away" some of the revenue windfalls or shortfalls observed on the basis of the more standardised approach. Take, for example, the case of a tax (stamp duty) on property transactions in a country experiencing a residential property boom. Since stamp duty is an indirect tax, the standardised tax base proxy is private consumption. If the value of property transactions is rising at a faster rate than private consumption expenditure, then one will observe positive residuals for this tax series. However, a better proxy for the tax base in the national accounts would be households' gross fixed capital formation (residential investment). If the latter is growing at a faster rate than private consumption, then the residuals measured on this basis should be smaller. The residuals would be expected to become smaller still if a more refined proxy for the tax base would be employed (e.g. the value of transactions in the property market). To the extent that residuals can be "explained away" by using more appropriate proxies for the tax base, this would suggest that there is potential to improve existing fiscal analysis, including methods of computing the cyclically adjusted budget balance using such variables.

2.4. The breakdown of revenues

A second focus of our paper is to better identify the revenue categories playing an important role in driving revenue windfalls and shortfalls and to analyse whether these display some pattern and are more likely to be permanent or transitory. In the context of the cyclical adjustment of the budget balance and the disaggregated framework, government revenues are typically broken down into four broad headings, reflecting national accounts definitions: direct taxes paid by households (mainly personal income tax), direct taxes paid by corporations (mainly corporate income tax), indirect taxes and social contributions.¹³ Such a presentation has the disadvantage of concealing changes in revenues coming from very different sources. For example, a positive residual for direct taxes paid by households may be caused either by higher taxes paid on wage income (e.g. because of large wage increases at the top end of the wage scale),

¹¹ For VAT the base is nominal private consumption. For excise duties it may be nominal or real consumption, depending on how the underlying revenue projection is made.

¹² For a discussion and an overview of how fiscal projections are made in the ECB see Leal et al (2007).

¹³ Again this is not a feature of the methodology as such, which can easily accommodate more detailed or alternative disaggregations, but rather common practice, reflecting, *inter alia*, the interests of a broadly harmonised approach across countries.



or because of higher capital income. By focusing on a somewhat more detailed breakdown of tax revenues, one can shed additional light on these issues.¹⁴

In our analysis, we break indirect taxes down into several sub-components, for which data is readily available. Firstly, value-added-tax (VAT) which in all EU Member States is the single most important indirect tax, typically accounting for around half of indirect tax receipts. Secondly, excise duties or "other taxes on consumption", in which context we generally distinguish between taxes on energy (fuel duties), tobacco, alcohol and others. The rationale for breaking consumption taxes down in this way is to observe any impact of consumption shifting.¹⁵ For example, in case of an increase in the price of oil negative residuals in indirect taxes may be caused by consumers reducing their consumption of heavily taxed fuel (e.g. by driving less or purchasing more efficient cars). In this case, one would expect to see negative residuals for energy taxes/fuel duties. Thirdly, there are a number of other indirect taxes, many of which are not specifically taxes on consumption. The most important of these in most countries are local business taxes and stamp duties (defined here broadly as taxes on the transfer of assets, e.g. residential property and shares). Residuals for these taxes would depend mainly on profits and developments in asset markets respectively.

The breakdown of direct taxes is less straightforward and generally less satisfactory due to the specificities of national tax systems. Only in a very limited number of jurisdictions are different sources of personal income taxed separately (e.g. in Ireland, households' capital gains are charged to capital gains tax which is collected separately and clearly distinguishable from income tax). But in practically all tax systems, some if not all sources of personal income (wages, pensions, interest, dividends, capital gains) are bundled together and charged to a single personal income tax. The situation as regards direct taxes paid by corporations is similar, as in many countries all forms of corporate income (operating profits and capital gains) are charged to a single corporation tax. Even in these cases, however, it is sometimes possible to at least partly disentangle taxes paid on different sources of income, if, for example, a major part of the tax is withheld at the source (as is often the case for wages). Where this has been deemed feasible, this information has been exploited to provide a more detailed breakdown of residuals also for direct taxes.

Finally, in our analysis, social contributions are broken down (generally) into social contributions paid by employers, those paid by employees and others (e.g. social contributions paid by the self-employed), again depending to some extent on the institutional set up in each country. For the sake of completeness, we also report residuals for "capital taxes", which in ESA 95 primarily consist of inheritance and gift taxes. This is a relatively small tax category, which should not be confused with taxes on capital income in the broader sense, and which is typically ignored in the cyclical adjustment of the budget balance.

2.5. Standard versus country-specific approaches

The calculations based on the alternative models that take better account of the country specific features of the tax and social contribution systems are important for analysing the sources of revenue windfalls and shortfalls as well as identifying the degree of problems in estimating and assessing fiscal developments in the different countries. On the other hand, while potentially yielding additional information, residuals estimated on the bases of different proxies for the tax bases lose some of their

¹⁴ It should be noted, however, that it may not always be possible to obtain estimates of the impact of all legislative changes according to the more detailed breakdown.

¹⁵ In the case of excise duties, which are taxes on quantities, the selection of a tax base proxy expressed in nominal (i.e. value) or real (i.e. volume) terms needs to be consistent with the way in which the impact of legislative changes is imputed. In case a nominal tax base proxy is used, indexation of the tax rate to prices would represent "no policy change". In case a real tax base proxy is used, any increase in the tax rate (even if below the rate of inflation) represents a positive legislative change.

comparability across countries. Especially in a multi-country setting (e.g. for EU fiscal surveillance) such a loss of transparency could be problematic and the need for transparency and comparability is one reason why cyclical adjustment procedures are typically relatively simple and standardised. Furthermore, for the tax bases used for cyclical adjustment it must be possible to estimate a trend or potential level and an elasticity with respect to GDP. Thus, it may not always be feasible to employ the tax bases and breakdowns used in the alternative models for cyclical adjustment purposes. In this case, there might be a windfall in the sense of a non-discretionary improvement of the structural budget balance even though a more detailed analysis based on a more full-fledged model can link the improvement to a specific, transitory factor.

3. The results

In this section, we focus on the results for an aggregate of the “big five” euro area countries (Germany, Spain, France, Italy and the Netherlands).¹⁶ As these five countries account for around 85% of euro area GDP, this aggregate can be seen as a rather reliable proxy for developments in the euro area as a whole. A more detailed discussion of results for these five countries (extending back to 1998 or 1999), as well as for Ireland and Portugal (extending back to 1998) and for Latvia (extending back to 2000), are provided in country sections. The results for our aggregate are reported both for the “harmonised” estimates employing the standard tax bases underlying the ESCB cyclical adjustment and disaggregated framework methodologies and for the alternative bases, more closely reflecting actual forecasting practices or expert judgement on the appropriate tax base proxy.¹⁷ On this basis, the results can be summarised as follows:

Unexplained changes in revenues over the period 1999-2007 have exhibited a cyclical pattern (see Table 1 and Panel a of Chart 2), which is more pronounced than that illustrated by a comparison of outcomes and targets based on stability programmes.¹⁸ The unexplained changes are of similar magnitude irrespective of whether the standardised or alternative tax base proxies are used in the estimations. There was a significant revenue windfall of around half a percentage point of GDP in 1999 followed by further significant windfalls during 2005 to 2007 and, in particular, in 2006. By contrast, significant shortfalls of around half a percentage point of GDP were recorded in 2001 and 2002. For the 1999-2007 period as a whole, residuals are slightly positive, but this can be explained by the contribution of Spain, where revenues were particularly buoyant due to country specific factors (see section 5.3). For the aggregate, direct taxes saw revenue windfalls, while there were revenue shortfalls for indirect taxes. The shortfalls in respect of indirect taxes were driven in particular by developments in Germany and France, while the other countries, and in particular Spain, benefited from windfalls in indirect taxes.

The main drivers of revenue windfalls and shortfalls have been taxes on profits and capital income, which we will refer to as “profit-related taxes”. Here we approximate profit-related taxes as the sum of (i) direct taxes paid by corporations; (ii) direct taxes paid by households other than taxes withheld on wage income and (iii) local business taxes (categorised, according to ESA95, as indirect taxes).¹⁹ The weight of

¹⁶ Our results are based on fiscal and macroeconomic data from autumn 2008.

¹⁷ The two sets of estimates do not give rise to fundamentally different results at the aggregate level.

¹⁸ The term “cyclical” is used here in a broad sense, meaning that revenue windfalls were generally observed in the periods in which output was growing strongly (i.e. 1999-2000 and 2004-2007), while shortfalls were observed in the period 2001-2003, when the euro area had entered a downturn following the bursting of the dot.com bubble.

¹⁹ NB: A precise breakdown between taxes paid on wage and non-wage income is not possible for all countries because income is generally taxed as an aggregate irrespective of the income source and detailed information concerning the sources of income taxes may not be available. Therefore some taxes paid on profits and capital income may still be included in the residuals for taxes on wages and salaries, while some taxes on wage income may be included here in profit-related taxes because they were not specifically withheld on wage income (see the country sections for further details). Overall, however, the approximation chosen here should be a relative good proxy for taxes on profits and capital income, including capital gains.

profit-related taxes in GDP varies considerably across countries and also from year-to-year. However, typically such taxes account for no more than around 4-5% of GDP or 10% of government revenues. In spite of this, profit-related taxes have accounted for clearly the largest part of the observed residuals over the sample period (see panel b of Chart 2) and understanding their origins is thus crucial for interpreting structural developments in public finances.

Two factors are generally seen as driving the observed cyclicity of profit-related taxes. The first factor relates to the well-known leads and lags in tax collection and more generally the complex nature of business taxation, which drives a significant wedge between the actual tax base and national accounts measures of profits. Typically, businesses first pay taxes on their estimated profits for the current tax year and then settle any remaining balances in later years when the actual value of taxable profits has been determined. Moreover, while losses do not give rise to negative taxation, losses in one period can usually be carried forward and offset against future profits. The lag structure of actual tax collection is unstable over time and is, thus, only partly captured by the fixed lag structures of the underlying models. In fact, the change in the lag structure over the cycle and the loss carry forward seems to even amplify the already high volatility of the tax base. More specifically, at some point during a downturn, lower estimated profits tend to coincide with negative back-payments to create revenue shortfalls. Tax receipts may then remain subdued for some time, even as profits begin to recover, as these can still be offset against previous losses. But at some point during the next upswing, these possibilities begin to expire and the combination of higher estimated profits and positive back payments gives rise to a surge in tax receipts. The second factor relates to “extraordinary” profits (e.g. capital gains) or losses (leading e.g. to write-offs on corporate balance sheets). The sharp decline in profit-related tax receipts in 2001-2003 followed the bursting of the dot.com bubble and the sharp decline in stock markets around the world, leading to capital losses which were then mostly recouped during the subsequent upturn.²⁰ Distinguishing between these two factors is difficult, however, especially since, as already mentioned, most tax systems do not (fully) distinguish between operating profits and capital gains.²¹

The impact of cyclicity in profit-related taxes is generally greater than would be inferred simply by looking at direct taxes paid by the corporate sector. In fact, our estimates suggest that residuals in taxes paid by households on their profits and capital income (and to a lesser extent local business taxes) can be equally important (see panel c of Chart 2). Unexplained changes in taxes paid by households on their profits and capital income would appear to lag slightly those for taxes paid by corporations. For example, in 2000, profit-related taxes paid by households were still very buoyant, but less so corporate taxes. During the more recent upturn, corporation tax receipts already started to rebound in 2004, while profit-related taxes paid by households only really became buoyant again in 2006-2007.

The fact that the measurement of revenue windfalls and shortfalls is so similar when the standardised and alternative tax base proxies are used reflects the fact that none of the available macroeconomic aggregates (operating surplus, entrepreneurial income, GDP etc) go anywhere near “modelling” the observed short-term fluctuations in profit-related taxes.

Unexplained changes in taxes on wages and salaries and social contributions are generally small (in relation to the importance of these revenue items) and do not seem to exhibit any cyclical pattern (see panel d of Chart 2). In many cases, residuals may be explained by the difficulty of accurately assessing

²⁰ It has to be noted that in 2001 a major enterprise tax reform came into force in Germany. While there are serious estimation problems concerning the impact of this reform in particular for the individual tax items this most likely doesn't affect the overall picture as described here.

²¹ For some countries, detailed data published by the tax authorities may help to distinguish between these various sources of fluctuations in tax revenues, however such data is usually available (if at all) only with a significant lag and such analysis goes beyond the scope of this paper. See the sections for Germany and France as regards the co-movement between residuals in profit-related taxes and asset prices in these countries.

the impact of legislative changes. An exception, however, is Spain where taxes on wages and salaries and social contributions were very buoyant, the reasons for which are difficult to discern.

Table 1: Unexplained changes in taxes and social contributions

Aggregate of Germany, Spain, France, Italy and the Netherlands¹⁾

(a) Standardised tax bases

	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	0.3	0.3	-0.1	-0.5	-0.2	0.1	0.3	0.4	0.4	1.1	0.1	0.3
paid by corporations, of which	0.2	0.1	-0.2	-0.2	-0.2	0.1	0.1	0.2	0.2	0.3	0.0	0.2
corporation tax	0.3	0.1	-0.3	-0.2	-0.1	0.1	0.1	0.2	0.1	0.3	0.0	0.2
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
paid by households, of which	0.1	0.2	0.1	-0.2	0.0	-0.1	0.2	0.1	0.3	0.8	0.1	0.2
on wages and salaries ²⁾	0.0	0.1	0.1	0.0	0.1	0.0	0.2	0.0	0.1	0.6	0.1	0.1
other ³⁾	0.1	0.1	0.0	-0.2	-0.1	0.0	0.1	0.1	0.2	0.2	0.0	0.1
other direct taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect taxes, of which	0.2	-0.3	-0.3	-0.1	-0.2	0.0	-0.1	0.1	-0.2	-1.0	-0.1	0.2
VAT	0.2	0.0	-0.1	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	0.1
Excise duties / other consumption taxes, of which	0.0	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.8	-0.1	0.1
energy, fuel	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.5	-0.1	0.1
tobacco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	0.0
alcohol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Local business taxes	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Stamp duties ⁴⁾	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0
Social contributions, of which	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0
paid by employers	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.3	0.0	0.0
paid by employees	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
other	0.0	0.0	0.0	0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Capital taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	0.6	0.1	-0.4	-0.6	-0.2	0.1	0.2	0.5	0.2	0.4	0.0	0.3

(b) Alternative tax bases

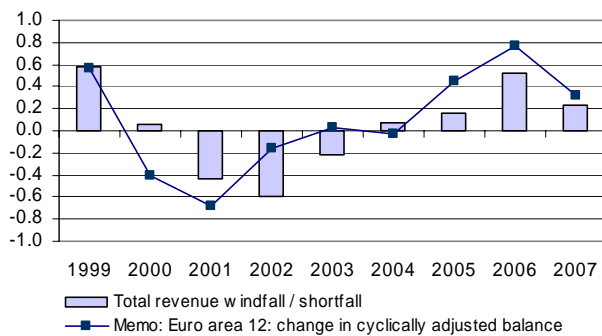
	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	0.3	0.3	-0.2	-0.4	-0.2	0.0	0.3	0.2	0.4	0.7	0.1	0.3
paid by corporations, of which	0.3	0.1	-0.2	-0.2	-0.1	0.1	0.1	0.2	0.1	0.3	0.0	0.2
corporation tax	0.3	0.0	-0.3	-0.2	-0.1	0.1	0.1	0.2	0.1	0.3	0.0	0.2
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
paid by households, of which	0.1	0.2	0.0	-0.2	-0.1	-0.2	0.2	0.0	0.2	0.4	0.0	0.1
on wages and salaries ²⁾	0.0	0.1	0.1	-0.1	0.0	-0.1	0.2	0.0	0.0	0.3	0.0	0.1
other ³⁾	0.1	0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.1	0.2	0.1	0.0	0.1
other direct taxes	0.0	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.3	10.2	1.1	1.1
Indirect taxes, of which	0.2	-0.1	-0.2	-0.1	-0.1	0.1	0.1	0.2	-0.2	-0.2	0.0	0.1
VAT	0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	0.1
Excise duties / other consumption taxes, of which	0.0	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0	0.0
energy, fuel	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0
tobacco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
alcohol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Local business taxes	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Stamp duties ⁴⁾	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0
Social contributions, of which	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.4	0.0	0.0
paid by employers	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.3	0.0	0.0
paid by employees	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Capital taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	0.6	0.2	-0.5	-0.4	-0.1	0.1	0.4	0.5	0.2	1.0	0.1	0.3

1) Aggregated using GDP weights. 2) For some countries includes taxes on non-wage income tax as part of personal income tax. 3) Mainly taxes on profits and capital income. 4) Taxes on the transfer of assets (e.g. residential property, shares etc).

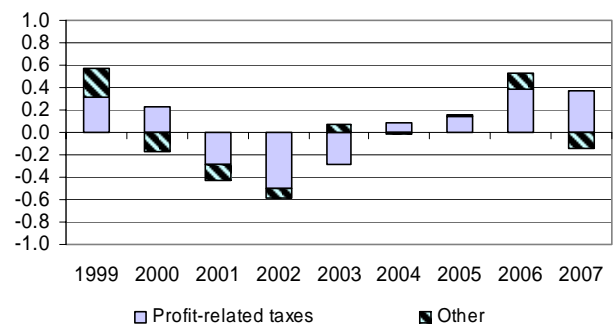
Chart 2: Unexplained changes in taxes and social contributions (% of GDP)

(aggregate of Germany, Spain, France, Italy and the Netherlands)

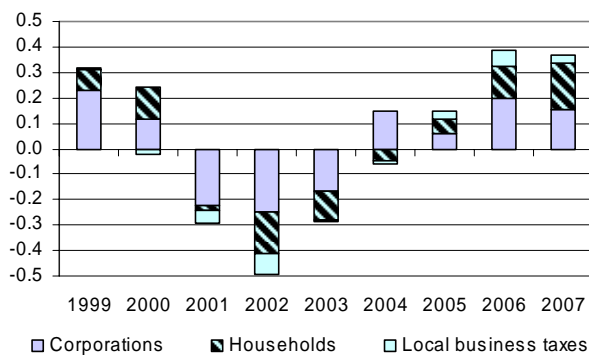
(a) Total revenue windfalls/shortfalls



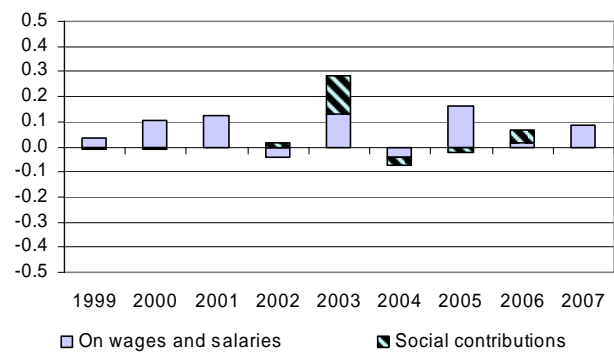
(b) Breakdown between "profit-related" taxes and "other"



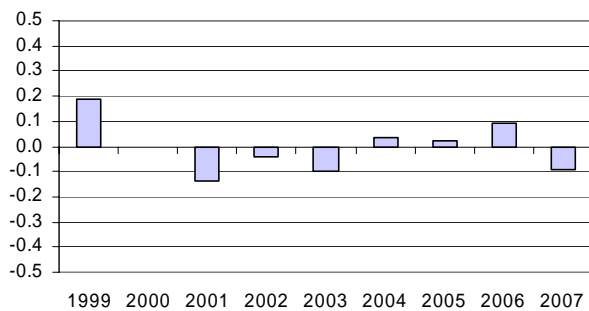
(c) Breakdown of profit-related taxes



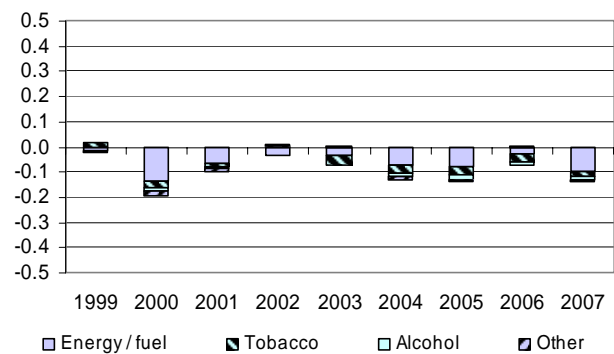
(d) Taxes on wages and salaries and social contributions



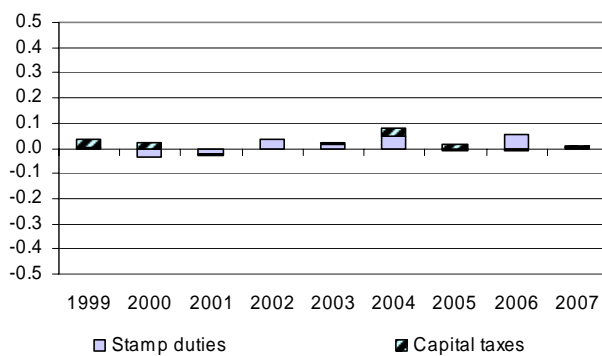
(e) Value-added-tax



(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



(h) Other direct and indirect taxes

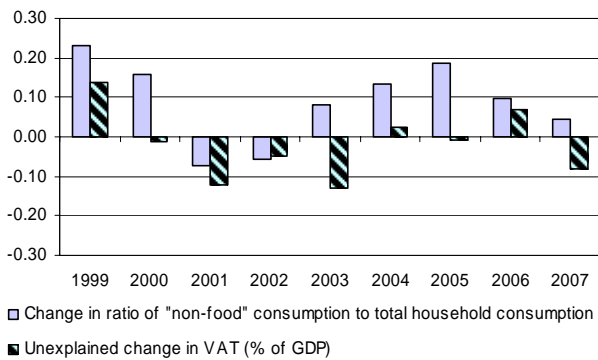


NB: Change in euro area 12 cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

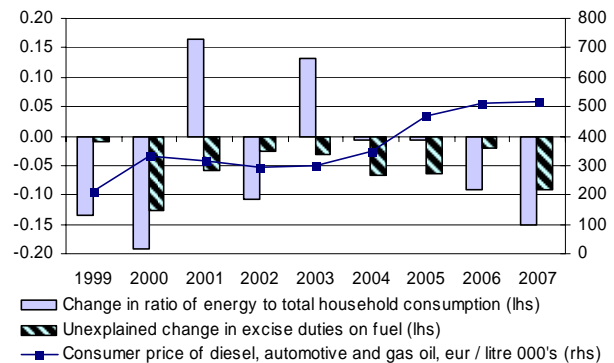
Chart 3: VAT, excise duties and consumption patterns

(aggregate of Germany, France, Italy and the Netherlands)

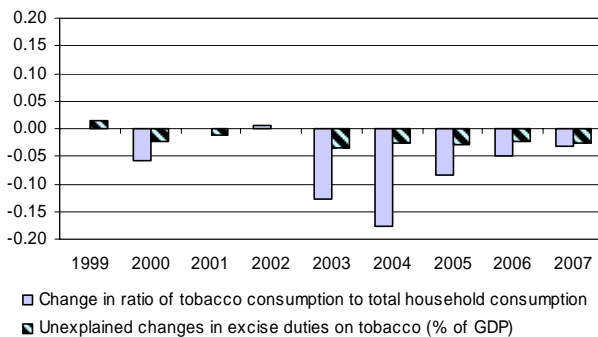
(a) VAT and food/non-food consumption



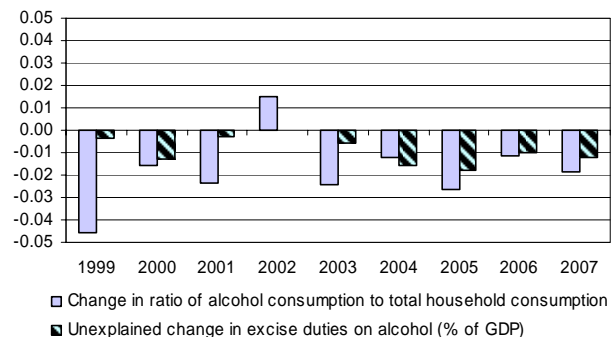
(b) Fuel duties and energy prices/consumption



(c) Tobacco duties and tobacco consumption



(d) Alcohol duties and alcohol consumption



Sources: ESA95 National Accounts, Weekly Commission Oil Bulletin Price Statistics

Residuals related to VAT also appear to exhibit a somewhat cyclical pattern, even though their importance compared to profit-related taxes is not that large (see panel e of Chart 2). Various factors may help to explain this phenomenon. Firstly, it may be caused by shifts in the composition of consumption. According to this view, during a downturn, the proportion of household's expenditure on goods exempt from VAT or subject to zero or reduced rates, such as food may increase and vice versa. Indeed, it can be seen from panel a of Chart 3 that, for example, the ratio of non-food consumption to total household consumption has displayed a cyclical pattern over the 1999-2007 period. As a result of such consumption patterns the VAT content of private consumption would tend to rise during upturns and decline during downturns. Secondly, it may be that insolvency-related tax shortfalls are higher in a cyclical downturn than during an upturn. Thirdly, and not specifically related to the economic cycle, unexplained changes in VAT receipts may be related to tax compliance. Several governments have taken action in this area in recent years, and these measures may have yielded more revenues than has been assumed. This would thus represent a structural increase in tax revenues. Fourthly, VAT is paid not only on households' purchases of consumer goods but also (partly) on government consumption and (government and household) investment. Especially households' gross fixed capital formation (mainly purchases of dwellings) may exhibit stronger cyclical fluctuations than the employed tax base (private consumption). For example, in Spain and Ireland, much of the boom in VAT receipts, which came to an end in 2007, would seem to be related to developments in the housing market (see also Martínez Mongay et al (2007) or de Castro et al (2008)). In general, the underlying causes for windfalls and shortfalls in VAT over the 1999-2007 period could be attributed to either cyclical or structural phenomena.

Employing overall private consumption as the tax base, unexplained changes in excise duties/other taxes on consumption are mostly negative, pointing to an impact of declining consumption of goods subject to

specific taxes. Especially taxes on energy/fuel duties exhibit negative residuals, which amount to more than 0.5% of GDP over the whole 1999-2007 period. It is also worth remarking that the residuals for energy/fuel taxes are particularly negative in 2000-2001 and again in 2004-2007, which broadly coincide with periods in which oil prices had been rising significantly, but are close to zero in 2002-2003, a period when oil prices were more subdued (see panel b of Chart 3). This potentially reflects a tendency for consumers to alter their consumption habits in response to movements in fuel prices. It may also be that governments refrain from increasing fuel duties when prices are rising and vice versa and these measures are not fully factored into the estimations. In addition, over the whole period, almost persistently negative residuals are observed for taxes on tobacco and alcohol (although these are very small reflecting the very small share of these taxes in GDP). Especially in the former case this is what one would expect given the trend towards lower consumption of tobacco products (see panels c and d of Chart 3).²² As far as excise duties are concerned in general, depending on whether a “nominal” or “real” tax base is used and thus how the impact of changes in tax rates are incorporated into the estimates, negative residuals could also be explained by higher than expected inflation. In the alternative estimates, for most countries either consumption of fuel, tobacco and alcohol have been employed as the tax base for the respective duties or a “volume-based” variable (e.g. real private consumption or real GDP) has been used and this is seen to reduce the size of the observed residuals considerably. For the period 1999-2007 as a whole, the cumulative sum of residuals is reduced from -0.8% to -0.2% of GDP.

Windfalls in “stamp duties” (defined here broadly as taxes (other than VAT) on the sale or purchase of assets) and in capital taxes (essentially inheritance and gift taxes) have been generally small (no more than 0.1% of GDP in any given year). However, they have been important for some countries, such as Spain and Ireland, which experienced booming property markets in recent years. Cumulatively between 2004 and 2006, windfalls in these taxes amounted to about 0.2% of GDP for our aggregate.

This still leaves some residuals pertaining to other direct and indirect taxes, which in some years can amount to as much as 0.1% of GDP. These mainly reflect fluctuations in country specific taxes, such as the tax on gaming and lotteries in Italy, which accounts for much of the negative residual in 2000.

In the aggregate, substituting the standardised tax base proxies with alternative tax base proxies drawing on forecasting models and expert judgement does not give rise to significantly different results. There are essentially two main reasons for this. The first is that (as already mentioned) there is no available macroeconomic aggregate that comes anywhere near explaining short-term fluctuations in profit-related taxes. The second is that, to the extent that residuals offset each other, being able to better explain developments in certain taxes doesn't necessarily give rise to better results overall. For example, in Table 1 it can be seen that the cumulative sum of residuals based on the standardised tax bases for the period 1999-2007 as a whole is just 0.4% of GDP, but this is largely because a cumulative positive residual in direct taxes and social contributions amounting to 1.2% of GDP is offset by a cumulative negative residual in indirect taxes amounting to -1.0% of GDP. In the estimates based on the alternative tax base proxies, the cumulative negative residual in indirect taxes is significantly reduced (as, in particular, the alternative tax base proxies performed better for excise duties), but the positive residuals for direct taxes and social contributions remain. So overall, the sum of cumulative residuals actually increases slightly.

4. Concluding remarks

Our analysis supports the view that revenue windfalls (shortfalls), in the sense of revenue growth above (below) what would normally be expected given legislative changes and the development of

²² Residuals for excise duties/other consumption taxes would be expected to decline if individual consumption components (e.g. consumption of fuel, tobacco, alcohol) would be employed to better proxy the tax base. This can be seen in the “alternative” estimates for Germany and Ireland.

macroeconomic variables used to proxy the tax bases, have been significant in recent years. For the “big-five” euro area countries, over the period 2005-2007, revenue windfalls amounted to around 1% of GDP, which broadly compensated for shortfalls of a similar magnitude during the downturn of 2001-2003. This implies that the deterioration in the euro area cyclically-adjusted deficit between 2000 and 2003 as well as most of the improvement between 2004 and 2007 could be attributed to factors other than active fiscal policy.

From a policy perspective, this poses some interesting questions and difficult challenges. Firstly, it implies that indicators commonly used to measure the fiscal stance or fiscal consolidation efforts such as the change in the cyclically adjusted primary balance or the structural balance may be misleading if interpreted too narrowly. Governments, central banks, institutions charged with fiscal surveillance and academics need to bear in mind that fiscal indicators that are corrected for the estimated impact of the economic cycle with the standard approaches may still be subject to significant fluctuations which, according to our estimations, may also display a cyclical pattern. Thus, in favourable economic conditions the improvement of the structural budget balance might be overstated by the existing indicators (and vice versa in an unfavourable economic environment). In particular for medium-term budgetary planning this implies that a prudent approach – allowing room to accommodate negative surprises without breaching budgetary rules – is advisable. Furthermore, there are structural factors other than legislative changes that significantly influence public finances. In short, one should not “simply” equate the change in the cyclically adjusted primary balance (or the structural primary balance) with discretionary fiscal policy.

Secondly, it raises the question of whether existing procedures for forecasting and cyclically adjusting tax revenues could be further enhanced. In this respect, especially in the case of a disaggregated cyclical adjustment methodology such as that employed within the ESCB, there may be some “quick wins” in the sense of a better matching of tax revenues to their bases. However, our results highlight the fact that a significant improvement in these measures will not be achieved unless the issue of fluctuations in profit-related taxes is adequately addressed. Given the underlying causes of these fluctuations, this is easier said than done. Furthermore, in multi-country settings (e.g. in the context of EU budgetary surveillance) transparent and harmonised approaches are needed, in particular because complex and instable estimation methods may be prone to error or manipulation. It is, however, important to be aware of and to understand the limitations of existing indicators, and it is crucial for policy-makers to take them into account in their budgetary planning. In this regard, the general advice would be, “if in doubt, be cautious”.

Thirdly, one might ask whether governments – to the extent that they are concerned by excessive fluctuations in tax revenues – might have an interest to seek to reduce such fluctuations by reforming the tax system. Generally speaking, more proportionate taxes (with fewer allowances etc) might generate fewer surprises. But clearly there are much broader issues of equity and efficiency, which have to be borne in mind in the design of the tax system. For example, the possibility for firms to carry forward their losses for tax purposes would seem to be an important component of a growth enhancing tax system, especially to encourage young and innovative firms with start-up losses and a volatile stream of profits. Another consideration is whether revenue windfalls that occur mainly during upturns and vice versa may be deemed desirable, since they may enhance the automatic stabilising properties of the tax system (i.e. going beyond the typically assumed functioning of the automatic stabilisers). In this regard, one may however consider that the macroeconomic impact of, say, a decline in tax receipts caused by a decline in asset markets or unusually high negative back payments is likely to be limited in normal circumstances. Generally - and given the high uncertainty surrounding the budgetary impact of changes in tax legislation - a more straight forward approach to decreasing surprises and enhancing stability might be a more medium-term focused tax policy aiming at achieving a stable tax system, while avoiding frequent legislation changes to reach short-term policy goals.

5. Country-by-country analysis

On the following pages, more detailed “country-by-country” analyses are provided. These are based primarily on the alternative tax base proxies selected by the respective analyst. Where important differences in the estimates arise because of the different approaches, they are highlighted and explained.

5.1. Germany

For Germany, over the period 1998-2007 the sum of unexplained changes of tax revenues and social contributions overall was somewhat negative. Within the period, unexplained developments in revenues have exhibited a cyclical pattern (assessed broadly on the changes of HP filter estimated output gaps), being positive in 1998-2000, negative in 2001-2004 and turning positive again in 2005-2007.

A detailed breakdown of revenues identifies the main source of volatility as stemming from taxes on profits and capital income (or “profit-related” taxes) and the results with the standard and alternative assessment bases are very similar in this regard. In Germany, profit-related taxes include corporation tax (*Körperschaftsteuer*); the assessed income tax (*Veranlagte Einkommensteuer*) containing the tax payments on the profits of unincorporated businesses and self-employed, but also back payments related to withheld income tax on wages and capital income; income tax withheld on capital income (*Kapitalertragsteuer*), mainly withholdings on interest and dividends; and the local business tax (*Gewerbesteuer*), which is classified under indirect taxes. While these taxes account for only around a tenth of overall government revenues from taxes and social contributions, they were by far the main drivers of unexplained revenue changes over the 1998-2007 period, accounting for almost the totality of the significant revenue shortfalls observed in 2001-02 and around three quarters of the windfalls observed since 2005. The residuals in these revenue categories are most likely related – at least in part – to the difficulties in assessing the fiscal impact of the significant tax legislation changes over the period. However, they also reflect the general problem of finding a good indicator for the tax base and the fact that the underlying tax model cannot take account of the unstable shares of advance and back payments for the individual assessment years as was mentioned in section 3.

Looking at the main tax heads, **direct taxes paid by corporations** exhibited a significant shortfall of 0.6% of GDP in 2001. Much of this has since been recouped by smaller windfalls of 0.1-0.2% of GDP in 2003, 2004 and 2006. The main driver of these developments was the corporation tax, which exhibited a dramatic decline in receipts in 2001 following the bursting of the dot.com bubble, which also marked the beginning of a prolonged slowdown of the German economy. Furthermore, in 2001 a corporate tax reform came into force that most likely implied an at least temporarily higher decline in receipts than estimated by the government for the draft law and underlying (for lack of better information) the calculations. Revenue windfalls since 2003 seem to reflect both considerable increases in prepayments as well as falling back payments for the preceding years.

Within **direct taxes paid by households**, the greatest proportion of unexplained changes in revenues was related to the assessed income tax and income tax withheld on capital income. This is in spite of the fact that these only account for about 15% of direct taxes paid by households compared to around 80% for wage taxes. Unexplained revenue developments from the assessed income tax exhibit a clear cyclical pattern, with revenue windfalls of 0.1-0.3% of GDP in 1998-2000 and 2005-07 and shortfalls in between. The tax withholdings on household’s capital income appear to exhibit a similar cyclical pattern, but with a lag of one year (the same also being true of income tax withheld on capital income paid by corporations). By comparison, unexplained changes for income tax withheld on wages and salaries (*Lohnsteuer*) have been small in general. They were significant in the years 2003 and 2005, however (amounting to around 0.2% of GDP, or up to 3% of total receipts of this tax category). It seems plausible that this is related to estimation errors regarding the impact of legislation changes in these years.

Germany: unexplained changes in taxes and social contributions

(a) standardised tax bases

as percentage of GDP	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	0.3	0.3	0.5	-0.4	-0.6	-0.2	0.0	0.4	0.5	0.4	1.0	0.1	0.4
paid by corporations,¹⁾ of which	0.0	0.1	0.2	-0.6	-0.2	0.1	0.1	0.0	0.2	0.0	-0.1	0.0	0.1
corporation tax	0.0	0.1	0.1	-0.7	0.0	0.2	0.1	0.0	0.2	0.0	-0.1	0.0	0.1
withheld on capital income	0.0	0.0	0.1	0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
paid by households, of which	0.3	0.2	0.3	0.2	-0.5	-0.3	-0.1	0.4	0.2	0.3	0.9	0.1	0.3
withheld on wages and salaries	0.0	-0.1	0.0	0.1	0.0	-0.2	-0.1	0.2	0.0	0.0	0.1	0.0	0.1
withheld on capital income	0.1	0.0	0.2	0.2	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.1
assessed income tax ²⁾	0.2	0.3	0.1	-0.1	-0.2	0.0	0.0	0.2	0.2	0.2	0.9	0.1	0.1
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
from the rest of the world	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0
Indirect taxes, of which	0.2	0.3	-0.4	-0.3	-0.3	-0.1	-0.1	0.3	-0.3	-0.9	-0.1	0.2	0.2
VAT	0.0	0.1	-0.1	-0.1	0.0	-0.1	0.1	0.0	0.2	-0.2	-0.1	0.0	0.1
other consumption taxes, of which	0.0	0.0	-0.2	0.0	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.8	-0.1	0.1
energy taxes	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.5	0.0	0.1
tobacco taxes	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.2	0.0	0.0
alcohol & coffee taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
local business taxes	0.2	0.0	0.0	-0.2	-0.2	-0.1	0.0	0.0	0.1	0.0	-0.1	0.0	0.1
stamp taxes ³⁾	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Social contributions, of which	-0.2	-0.2	-0.2	0.0	0.1	0.0	-0.1	-0.1	0.0	0.0	-0.7	-0.1	0.1
paid by employers and employees, of which	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.0	-0.6	-0.1	0.1
employers social contributions	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.3	0.0	0.0
employees social contributions	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.3	0.0	0.0
to health and long-term care insurance for pensioners	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
by unemployment agency	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	-0.2	0.0	0.0
other, of which	0.0	-0.1	0.0	0.0	0.1	0.0	-0.1	0.1	-0.1	0.1	-0.1	0.0	0.1
imputed	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital taxes⁴⁾	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.3	0.3	0.0	-0.8	-0.9	-0.4	-0.2	0.2	0.7	0.1	-0.6	-0.1	0.4
of which on profits and capital income ⁵⁾ , of which	0.5	0.3	0.5	-0.7	-0.8	-0.1	0.1	0.2	0.6	0.4	0.9	0.1	0.4
assessed	0.3	0.4	0.2	-1.0	-0.4	0.1	0.1	0.3	0.5	0.3	0.8	0.1	0.4
non-assessed	0.2	-0.1	0.3	0.2	-0.4	-0.2	-0.1	-0.1	0.1	0.1	0.1	0.0	0.2

(b) alternative tax bases

as percentage of GDP	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	0.3	0.3	0.4	-0.6	-0.5	-0.2	-0.2	0.3	0.3	0.3	0.4	0.0	0.3
paid by corporations,¹⁾ of which	0.0	0.1	0.1	-0.7	-0.1	0.1	0.1	0.0	0.2	0.0	-0.1	0.0	0.1
corporation tax	0.0	0.1	0.1	-0.7	0.0	0.2	0.1	0.0	0.2	0.0	0.0	0.0	0.1
withheld on capital income	0.0	0.0	0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
paid by households, of which	0.2	0.2	0.3	0.0	-0.4	-0.4	-0.3	0.3	0.1	0.3	0.3	0.0	0.2
withheld on wages and salaries	0.0	-0.1	0.0	0.1	0.0	-0.2	-0.1	0.2	0.0	0.0	0.1	0.0	0.1
withheld on capital income	0.1	0.0	0.1	0.0	-0.2	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1
assessed income tax ²⁾	0.1	0.3	0.1	-0.1	-0.2	-0.1	-0.2	0.1	0.1	0.2	0.3	0.0	0.1
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
from the rest of the world	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Indirect taxes, of which	0.2	0.2	-0.2	-0.4	-0.2	-0.1	0.0	0.1	0.3	-0.2	-0.3	0.0	0.2
VAT	0.0	0.1	-0.1	-0.2	0.0	0.0	0.0	0.0	0.2	-0.2	-0.2	0.0	0.1
other consumption taxes, of which	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
energy taxes	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tobacco taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
alcohol & coffee taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
local business taxes	0.2	0.0	0.0	-0.2	-0.2	-0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.1
stamp taxes ³⁾	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Social contributions, of which	-0.2	-0.2	-0.2	0.0	0.1	0.0	-0.1	0.1	0.0	0.0	-0.4	0.0	0.1
paid by employers and employees, of which	-0.2	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.1	0.0	-0.5	-0.1	0.1
employers social contributions	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.3	0.0	0.0
employees social contributions	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.3	0.0	0.0
to health and long-term care insurance for pensioners	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
by unemployment agency	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other, of which	0.0	-0.1	0.0	0.0	0.1	0.1	-0.1	0.1	-0.1	0.1	0.0	0.0	0.1
imputed	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital taxes⁴⁾	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total	0.3	0.3	0.1	-1.0	-0.7	-0.3	-0.2	0.4	0.6	0.2	-0.2	0.0	0.4
of which on profits and capital income ⁵⁾ , of which	0.4	0.3	0.4	-0.9	-0.7	-0.1	-0.1	0.2	0.5	0.4	0.4	0.0	0.4
assessed	0.3	0.4	0.2	-1.0	-0.4	0.1	0.0	0.2	0.4	0.2	0.3	0.0	0.3
non-assessed	0.1	-0.1	0.2	0.1	-0.2	-0.2	-0.1	0.0	0.0	0.1	0.0	0.0	0.1

1) Results for minor revenues from the abolished wealth tax are not shown separately. 2) Income tax on profits of unincorporated firms, on income of self-employed and on capital income of households as well as back payments related to withheld income taxes. 3) Estate tax. 4) Inheritance and gift tax. 5) Also including direct taxes from the rest of the world, of which an important part are taxes on capital income.

AVE = average, ABS = average of absolute residuals

For **indirect taxes**, the local business tax (together with VAT) is the largest single contributor to unexplained changes in revenues despite representing only around 11% of indirect tax revenues

(compared to around 53% for VAT). Windfalls of 0.2% of GDP (around 10-20% of total local business tax receipts) were observed in 1998 and 2006, with similar shortfalls in 2001-02.

Unexplained changes in VAT were significant in some years (-0.2% of GDP in 2001 and 2007, +0.2% in 2006), although this represents at most a deviation of around 3% of VAT receipts. The reasons for these deviations are unclear. The weak development in 2001 is often assumed to reflect an increase in tax fraud (mainly carousel fraud) and insolvency-related losses²³, but it is difficult to quantify these effects. The development in 2006-2007 seems to match the view that owing to the significant increase in the regular VAT tax rate in 2007 (from 16% to 19%) purchases of regularly taxed consumption goods and services were shifted from 2007 to 2006. This was indeed the case, but changes in the average tax rate owing to shifts in the composition of the tax base are approximately accounted for in the underlying VAT model as far as data is available (which relies on estimates itself, however).

Unexplained changes in excise taxes are relatively small. For this, the choice of the tax bases that are employed for energy (i.e. petrol, diesel etc.) and tobacco (cigarettes etc.) taxes is highly relevant. More specifically, given that the consumption of “energy” and tobacco has declined as a proportion of overall consumption in recent years, the unexplained changes for these taxes reported in the table are smaller for the alternative than for the standard base (real private consumption). Unexplained changes in other indirect taxes are also small in relation to GDP.

Unexplained changes in **social contributions** are mostly small, but there were negative residuals in almost all years reaching as much as 0.2% of GDP per year in 1998-2000. Moreover, over the whole period, residuals are significantly negative for contributions paid by employees and employers.²⁴ This might have been caused by higher paid employees opting out of the statutory health insurance scheme and joining private schemes instead. This implies that aggregate income subject to social contributions developed more weakly than the revenue base used for the calculations (gross wages and salaries) and the negative impact is structural.

Unexplained changes in **capital taxes**, essentially the inheritance and gift tax (*Erbschaftsteuer*) have been negligible in the case of Germany.

Unexplained changes in profit-related taxes: CDAX as complementary base indicator and forecasting uncertainty

During 1998-2007, receipts from profit-related taxes fluctuated strongly and displayed a cyclical pattern, even if adjusted for the (estimated) impact of legislation changes and regular cyclical components. To illustrate the point Chart DE 1 shows the adjusted tax revenue. The correlation of the trend deviation of the adjusted revenue with the contemporary (next year's) trend deviation of real GDP is 0.8 (0.9). While entrepreneurial and property income – a common macroeconomic base variable – seems to approximate medium-term revenue growth reasonably well, it cannot trace the shorter-term revenue volatility, and consequently the revenue windfalls/shortfalls in this category were considerable. To account for the additional volatility it is sometimes proposed to complement national accounts macro bases with an asset price index. First, asset price indices are usually closely related to enterprise earnings and are, thus, a suitable candidate for a tax base indicator. Second, the value adjustments reflected in the asset price index

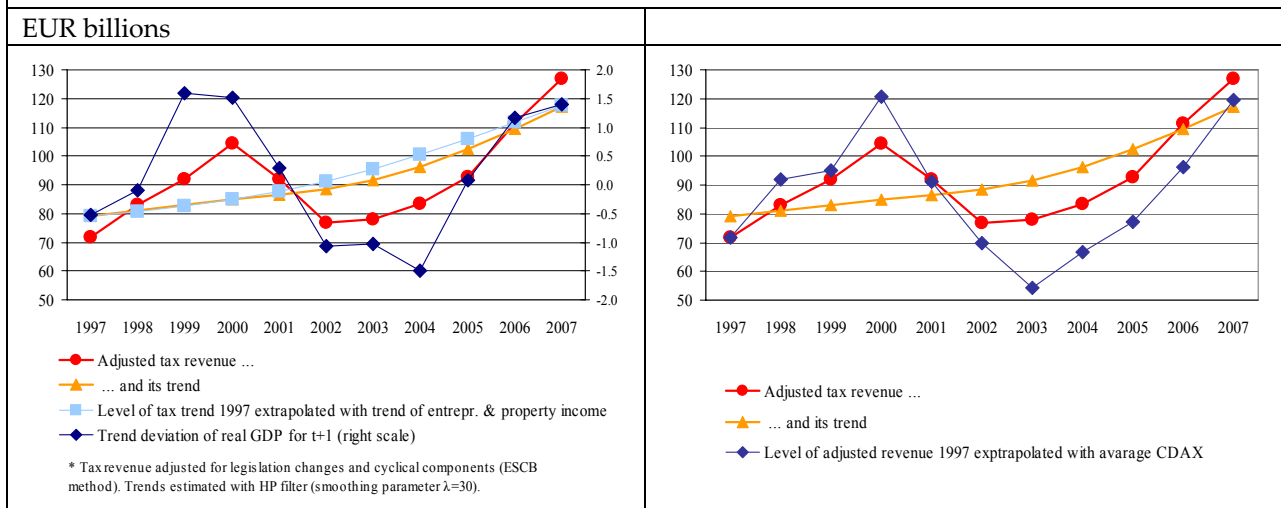
²³ While the basic idea of VAT is that it is borne by the final consumer, in practical terms VAT is first charged by firms to the consumer and then paid by the firms to the state. Thus, if a firm becomes insolvent the tax payment might be lost. Changes in the amount of insolvency-related losses, e.g. owing to a changing number of insolvencies over the economic cycle, might therefore show up in unexplained developments according to the definition employed in this paper.

²⁴ In Germany social contributions in a given year are proportional up to a certain income ceiling. However, since the income ceiling is indexed to wage growth the elasticity with regard to wage growth is equal to one.

might be tax-relevant, but are not recognised in the national accounts bases. Indeed, the CDAX (a broad equity price index for Germany) shows similar fluctuations as the adjusted tax revenue, and the correlation of the growth rate of the adjusted tax revenue and the CDAX is relatively high (0.9).

While there is some co-movement of asset price and profit-related tax volatility the reason might just be that both fluctuate in a similar way over the economic cycle. Furthermore, for forecasting, the relationship might be of limited use, since the CDAX is obviously difficult to forecast and owing to the relatively loose relationship the CDAX information might also be misleading in individual years. Generally, the unexplained volatility poses a serious problem for tax forecasts and is responsible for significant forecasting errors. This is highlighted in chart DE 2 for the German official tax forecast. In this forecast cash receipts for year t are estimated in November of year $t-1$ as the basis for next year's central government budget (and generally also for the state budgets). The chart shows the errors of the tax forecasts net of revision attributable to errors in the macroeconomic forecast²⁵ and the unexplained developments in tax revenues as identified in this paper. While the macro development is treated as an exogenous input to the official tax forecast, developments not explained by the forecasting models are estimated based on different information sources and expert judgment.²⁶ The adjusted forecasting errors are clearly related to the unexplained developments even though the extent of the co-movement is different for the different years.

Chart DE 1: Profit-related taxes and base indicators*

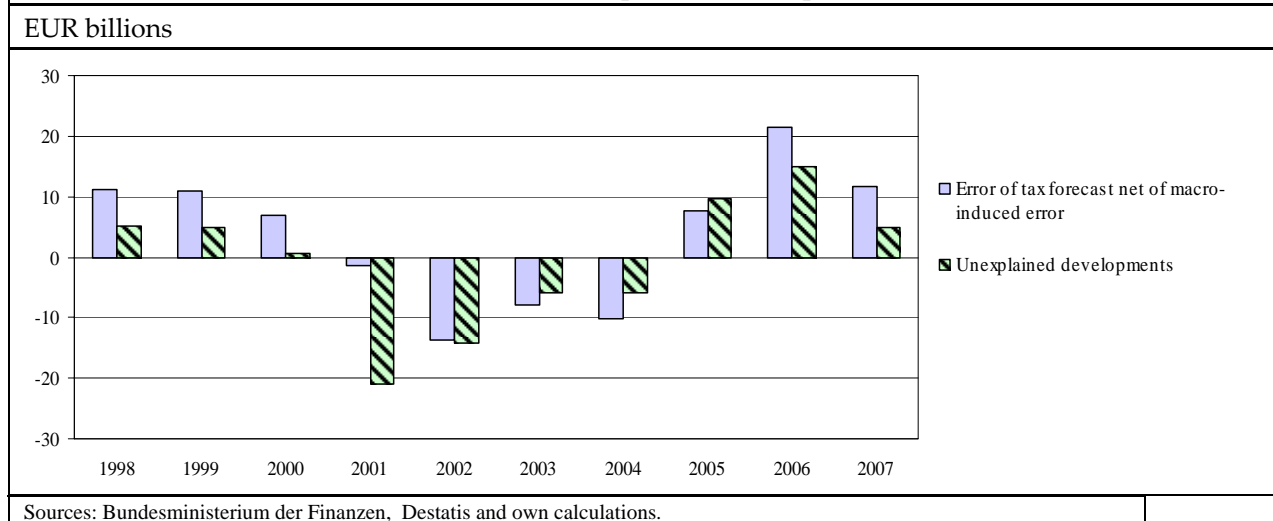


Sources: Bundesministerium der Finanzen, Destatis, Deutsche Börse AG and own calculations.

²⁵ The forecasting error for year t attributable to macro revisions is calculated as the difference in the revenue level as projected using the revenue level of $t-1$ and the GDP growth rate of t from the perspective of both year $t+1$ and the time of estimation (November of $t-1$). In this way also a base effect (difference between revenue outcome and estimate for $t-1$) is included.

²⁶ Of course, the models underlying the calculation of the unexplained development presented here are not the same as underlying the official tax forecast. Even so, the unexplained developments may be interpreted as an indicator for the residuals in tax forecasting models in general.

Chart DE 2: The role of macro revisions and unexplained developments for tax forecasts



5.2. Ireland

The period from 1998 to 2007 was predominantly one of buoyant growth for the Irish economy. Such economic conditions have been closely reflected in the pattern of unexplained tax receipts. Tax revenue windfalls are evident in seven of the ten years under consideration while shortfalls are uncovered in 2001, 2002 and 2007, periods of less buoyant growth in the Irish economy. On the basis of the tax bases and elasticities employed in the context of the disaggregated framework, the sum of unexplained changes in tax revenues and social contributions between 1998 and 2007 amounts to approximately 4.5 per cent of GDP. Windfalls were particularly large in 1999 and 2006 (1.5 and 1.8 per cent of GDP, respectively), while windfalls of around 1.0 per cent of GDP were recorded in 2000 and 2004. Each of the main tax heads contributed to the residuals observed, albeit to varying degrees. Using alternative tax base proxies, which more accurately reflect the functioning of the Irish tax system, yields smaller residuals for some tax series.

Direct taxes paid by enterprises (henceforth, corporation tax) made a sizable contribution to unexplained revenue developments according to the disaggregated framework. Corporation tax is levied on the profits (i.e. business or trading income) and capital gains (other than gains from development land) of companies resident in Ireland. In the context of the disaggregated framework, the tax base proxy employed is gross operating surplus, with an elasticity of 1. While corporation tax receipts account for an average of 10 per cent of overall tax revenues, the residuals in respect of this tax head are amongst the largest when viewed on an annual basis. The alternative proxy tax base selected to more accurately reflect developments in corporation tax is nominal GDP, also with an elasticity of 1. The alternative tax base fails to significantly change the overall size and pattern of residuals observed. The unexplained corporation tax developments primarily reflect the difficulty in identifying an appropriate proxy for the tax base. The scale of multinational operations in Ireland particularly complicates the identification of a reliable proxy. Furthermore, capital gains are incorporated into a company's profits for corporation tax purposes and, as a result, an asset price effect may also have been partly responsible for the residuals observed. Moreover, the impact of discretionary policy measures have been particularly difficult to assess in relation to corporation tax as the payment arrangements have undergone significant changes over the 2002 to 2006 period, with the payment date effectively moving from a preceding year to a current year basis. The residuals during this five-year period may therefore have been partly driven by the problems encountered in quantifying the impact of such changes.

Direct taxes paid by households primarily consist of income tax and capital gains tax. On the basis of the disaggregated framework, the sum of unexplained income tax²⁷ developments amounts to 1% of GDP. Replacing average wages and salaries with average compensation per employee in the tax base proxy fails to substantially reduce the size of residuals observed. Residuals in relation to income tax vary considerably in terms of both magnitude and direction. These residuals are, however, predominantly positive and most likely reflect progress made in relation to tax compliance. In excess of €2.4 billion in income tax receipts were collected between 2000 and 2007 as part of the Revenue Commissioner's special investigations into undisclosed tax liabilities. Proceeds from these investigations would explain a large part of the income tax windfalls in the years 2000, 2004 and 2006, when windfalls were particularly large. In addition, the actual impact of discretionary policy measures may differ somewhat relative to that estimated.

Capital Gains Tax (CGT), which is payable on the gains arising from the disposal of assets, was one of the most important sources of revenue windfalls during the period 1998-2007. Using nominal GDP as proxy for the tax base and an elasticity of 1, unexplained CGT developments were positive in each of the years under consideration, with the exception of 2002 and 2007. In cumulative terms, the residuals amounted to around 1.3 per cent of GDP over the ten-year period. Such windfalls are likely to reflect the fact that asset price developments and, in particular, rising yields from property transactions, are not reflected in the proxy base employed. A more detailed breakdown of CGT receipts on the basis of asset type is not available.

In the case of **indirect taxes**, residuals have been comparatively modest on average, albeit sizable across individual years. An average windfall of 0.5 per cent of GDP was observed during 2004 to 2006, which compares with an average shortfall of 0.4 per cent of GDP during 2001 to 2003. The indirect tax residuals reflect, to varying degrees, developments across all indirect tax sub-heads.

Turning to VAT, cumulative windfalls amount to around 1.3 per cent of GDP between 1998 and 2007. Record house building combined with rising property prices contributed to such windfalls as VAT is levied at 13.5 per cent on all new housing units. This revenue source is not however included through the use of private consumption expenditure as a tax base proxy. The buoyancy of the property market and of the Irish economy more generally throughout the period under consideration also entailed a dramatic change in the composition of private consumption, with a move towards more highly taxed goods and, as a result, an increase in the average VAT rate. Employing a broader proxy to capture such revenue sources reduces the unexplained revenue shortfalls. Nevertheless, sizeable unexplained VAT residuals remain, reflecting the difficulty in fully capturing housing-related activity within the proxy base.

Employing the tax base proxies of the disaggregated framework, excise duties are the single largest source of unexplained changes in revenue even though they play a considerably less prominent role as a source of tax revenue (accounting for just over 10 per cent of taxes and social contributions). Using nominal private consumption expenditure to proxy the tax bases together with an elasticity of 1 yields cumulative residuals of -1.9 per cent of GDP. The persistent negative residuals observed reflect the fact that private consumption expenditure fails to adequately capture the steady downward trend in the consumption of tobacco, alcohol and energy (which declined from 17.1 per cent of overall consumption expenditure in 1998 to 13.5 per cent in 2007). Relying upon the consumption of tobacco, alcohol and energy as the respective tax base proxies results in both a reversal in the direction of the residuals and a significant decline in their size, with a cumulative windfall of 0.4% of GDP. Such a windfall may relate to errors in the assessed impact of changes to tax legislation.

²⁷ They also include Deposit Interest Retention tax.

Ireland: unexplained changes in taxes and social contributions

(a) standardised tax bases

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes¹, of which	0.2	1.0	0.8	0.1	-0.9	0.4	0.4	0.0	1.2	0.1	3.1	0.3	0.5
paid by enterprises	0.1	0.6	0.0	0.1	-0.2	0.2	-0.3	-0.1	0.4	0.0	0.7	0.1	0.2
paid by households, of which	0.1	0.4	0.8	0.0	-0.7	0.1	0.7	0.1	0.8	0.0	2.4	0.2	0.4
Income Tax	0.0	0.2	0.5	0.0	-0.4	-0.2	0.6	-0.1	0.3	0.2	1.0	0.1	0.3
Capital Gains Tax	0.1	0.2	0.2	0.0	-0.3	0.4	0.1	0.2	0.5	-0.1	1.3	0.1	0.2
Indirect taxes, of which	0.2	0.2	0.0	-0.6	-0.1	-0.4	0.4	0.6	0.5	-0.8	-0.1	0.0	0.4
VAT	0.2	0.1	0.2	-0.2	0.1	0.1	0.2	0.3	0.1	0.0	1.3	0.1	0.2
Excise duties	0.0	-0.1	-0.3	-0.4	-0.2	-0.4	-0.1	-0.1	-0.1	-0.2	-1.9	-0.2	0.2
fuel	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.0	-0.5	0.0	0.1
tobacco	-0.1	0.0	-0.2	0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.8	-0.1	0.1
alcohol	-0.1	0.0	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	-0.5	0.0	0.1
other	0.1	0.0	0.1	-0.3	0.0	0.0	0.1	0.1	0.0	-0.1	-0.1	0.0	0.1
Stamp duty	0.1	0.2	0.0	0.0	-0.1	0.1	0.1	0.4	0.4	-0.5	0.8	0.1	0.2
Other indirect taxes	-0.1	-0.1	0.0	0.0	0.1	-0.3	0.2	0.0	0.0	-0.2	-0.3	0.0	0.1
Social contributions, of which	-0.1	0.3	0.2	0.3	0.4	0.1	0.1	-0.1	0.1	0.1	1.5	0.1	0.2
Employers actual social contributions	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.2	0.1	1.2	0.1	0.1
Employees social contributions	-0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.0	-0.1	0.1	0.4	0.0	0.1
Other social Contributions	-0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.1
Capital taxes (capital acquisitions tax)	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.3	1.5	1.0	-0.3	-0.7	0.1	0.9	0.6	1.8	-0.6	4.5	0.5	0.8

(b) alternative tax bases

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes¹, of which	0.2	1.1	0.8	0.1	-0.9	0.3	0.3	-0.1	1.2	0.0	3.2	0.3	0.5
paid by enterprises	0.1	0.6	0.0	0.1	-0.2	0.2	-0.4	-0.2	0.4	0.0	0.8	0.1	0.2
paid by households, of which	0.1	0.4	0.8	0.0	-0.7	0.1	0.7	0.1	0.8	0.0	2.4	0.2	0.4
Income Tax	0.0	0.2	0.5	0.0	-0.4	-0.2	0.6	-0.1	0.3	0.2	1.0	0.1	0.3
Capital Gains Tax	0.1	0.2	0.2	0.0	-0.3	0.4	0.1	0.2	0.5	-0.1	1.3	0.1	0.2
Indirect taxes, of which	0.3	0.2	0.3	-0.4	0.0	-0.6	0.1	0.5	0.4	0.1	0.9	0.1	0.3
VAT	0.2	0.1	0.2	-0.2	0.1	-0.2	-0.1	0.2	-0.2	0.5	0.6	0.1	0.2
Excise duties	0.2	0.2	0.1	-0.2	0.0	-0.1	0.1	0.1	0.1	0.0	0.4	0.0	0.1
fuel	0.1	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.1
tobacco	0.0	0.0	-0.1	0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
alcohol	0.0	0.0	0.0	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other	0.1	0.1	0.2	-0.3	0.0	0.0	0.1	0.1	0.0	-0.1	0.2	0.0	0.1
Stamp duty	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.1	0.2	0.4	-0.2	0.2	0.0	0.1
Other indirect taxes	-0.1	-0.1	0.0	0.0	0.1	-0.3	0.2	0.0	0.0	-0.2	-0.3	0.0	0.1
Social contributions, of which	-0.1	0.3	0.2	0.3	0.4	0.1	0.1	-0.1	0.1	0.2	1.6	0.2	0.2
Employers actual social contributions	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.2	0.1	1.2	0.1	0.1
Employees social contributions	-0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.0	-0.1	0.1	0.4	0.0	0.1
Other social Contributions	-0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.1
Capital taxes (capital acquisitions tax)	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.4	1.6	1.3	-0.1	-0.5	-0.1	0.6	0.3	1.7	0.3	5.6	0.6	1.0

^{1/} Other direct taxes, consisting mainly of Motor tax, have not been analysed due to data constraints.

AVE = average, ABS = average of absolute residuals

Stamp duty is primarily levied upon residential and commercial property transactions and is charged ad valorem of the value underlying the respective transaction. In addition, stamp duty is charged on the purchase of shares, insurance policies together with bank cheques and cards (i.e. ATM cards and credit cards). While stamp duty is considerably less important than VAT in terms of its share of overall tax revenue, average residuals in respect of this tax category are of comparable size when private consumption is employed as the tax base proxy. On this basis, sizable positive stamp duty residuals are uncovered amounting to 0.8% of GDP over the 1998 to 2007 period. The large positive residuals are primarily concentrated in 2005 and 2006 reflecting, in particular, rising property prices together with record levels of activity within the Irish property market at that time. In order to better capture such activities, in our alternative estimates, residential investment is used to proxy the tax base. Stamp duty is also charged on the purchase of shares. However, property investment tends to be prioritised over share ownership in Ireland. While residuals remain when residential investment is employed as the proxy base, it clearly captures the evolution of stamp duty receipts more satisfactorily than private consumption.

Turning to **social contributions**, significant revenue windfalls are observed for the period 1999-2002. The reason behind such sizeable deviations during these years is largely unclear. Given that the bulk of residuals pertain to social contributions paid by employers and the discretionary measures introduced during this period primarily relate to this category, errors in quantifying the impact of legislation changes may have played a role.

The residuals in relation to **capital taxes** (capital acquisitions tax), which include taxes on inheritance and gifts, are minor.

5.3. Spain

Since the mid-nineties and until 2007, Spain experienced a protracted period of strong economic growth. A number of factors explain this remarkable performance, in particular, fast employment growth driven by significant immigration inflows and increased labour participation, as well as favourable lending conditions, which boosted the demand for dwellings. These two elements, especially the latter, are highly relevant to explain the positive behaviour of tax receipts between 1999 and 2007. During this period, revenue windfalls have been notable in almost every year. On the basis of the tax bases and elasticities employed for Spain in the context of the disaggregated framework, the sum of the unexplained revenues since 1999 turns out to be sizeable for almost all revenue items, totalling 7.2% of GDP. The largest deviations are observed for social contributions (1.9% of GDP) and direct taxes (3.8% of GDP), especially direct taxes paid by enterprises (2.5% of GDP). As a consequence, the ratio of direct taxes to GDP increased by almost 3% between 1998 and 2007 despite three reforms enacted in 1999, 2003 and 2007 aimed at lowering the direct tax burden.

Looking in more detail at the main tax heads, **direct taxes paid by households** increased their weight in GDP from 7.3% in 1998 to 8.1% in 2007. These taxes comprise the personal income tax (*IRPF*), the non-residents income tax and the wealth tax (*Impuesto sobre el Patrimonio*), although the former represents around 94% of the total and determines almost completely the behaviour of the aggregate. In particular, the weight of *IRPF* remained broadly stable along the period considered, at around 6.6% of GDP, with the exception of 2007, when it jumped to 7.6% of GDP. This relative stability can be explained by the tax reforms implemented in 1999, 2003 and 2007, whose cost is estimated at around 0.9%, 0.4% and 0.3% of GDP, respectively. On the basis of the disaggregated framework, unexplained changes in direct taxes paid by households have been considerable, amounting to 1.3% of GDP in cumulative terms since 1999 (and reaching 0.8% of GDP in 2007 alone).

A breakdown of *IRPF* receipts according to different sources of income is available from the State Revenue Agency (AEAT).²⁸ Typically around 90% of *IRPF* receipts relate to taxes withheld on labour income (including pension benefits).²⁹ For 1999-2007 as a whole, taxes withheld on labour income can basically account for the sum of positive revenue windfalls of around 1.1% of GDP. It is worth noting that using average wages and salaries or average compensation per employee as the tax base makes little difference to the size of the residuals. Nor does the use of official records of affiliates, instead of employment in the national accounts, help that much even though the former has shown somewhat higher growth rates than the latter. There is also no obvious cyclical pattern; however given that the period under consideration is characterised by an economic expansion and does not cover a full business cycle, the results obtained might still be consistent with a somewhat cyclical behaviour of tax revenues.³⁰ In this connection, it is worth noting that the *IRPF* reforms enacted in the period under scrutiny have entailed some (albeit moderate) increases in progressivity.³¹ This might imply that the elasticity used in the estimates could be inaccurately low for the last years. Though not shown in the table, applying a higher elasticity (of 1.7 rather than 1.5) to the same tax base reduces the estimate of accumulated revenue windfalls for withholdings on labour income by around a half. As regards the other components of *IRPF* receipts, withholdings on capital income and payments by instalment (*pagos fraccionados*), mostly paid by

²⁸ See AEAT (2007).

²⁹ Pension benefits account for around 15% of *IRPF* declared income. Along the period analysed, contributory pensions declined from 8.1% of GDP in 1999 to 7.6% of GDP in 2007.

³⁰ De Castro *et al.* (2008) provide some evidence about this hypothesis in the case of Spain.

³¹ See García Vaquero and Hernández de Cos (2003), Hernández de Cos and Martí Esteve (2003) and Argimón *et al.* (2007).

unincorporated businesses, exhibited negative residuals on average, which have been more than offset by positive residuals in the final net tax payable (*cuota diferencial*) and the “rest” (which includes other, very small components of the IRPF as well as the tax on non-residents and the wealth tax). The taxation of capital gains related to the real estate boom and gains accumulated by stock markets in recent years might be a factor explaining recent positive residuals in the final net tax payable.

Despite **direct taxes paid by enterprises** representing less than 5% of GDP and around only one-tenth of revenues overall, this tax category accounted for around one-third of revenue windfalls recorded between 1999 and 2007. On the basis of the disaggregated framework, accumulated windfalls amounted to 2.5% of GDP. While mostly positive, unexplained changes in corporate tax revenues have also exhibited a somewhat cyclical pattern, with positive residuals in 1999-2000 and 2004-2007 interspersed by a more mixed development in 2001-2003.

Also for the corporate income tax, a more detailed breakdown of receipts according to different sources of income is available. Firstly, “payments by instalment” are based on firm’s estimated profits for the current year and generally account for around one-half to two-thirds of total corporate income tax receipts. The resulting residuals account for around half of total accumulated residuals since 1999. Secondly, residuals on withholdings on capital income are small and negative (this is true irrespective of whether the gross operating surplus of the corporate sector or property income received by firms is used as the tax base). The rest, including the final net-tax payable (*cuota diferencial*), accounts for the largest share of the residuals. This third component of corporate-tax revenues is expected to be related mainly to extraordinary profits (i.e. profits not-related to regular trading income), including capital gains in corporate balance sheets. Notwithstanding this theoretical insight, unexplained residuals and stock price changes display a correlation of just 0.4, whereas the correlation with housing prices is negative for the period analysed.

Indirect taxes show sizeable positive residuals in most years that amount to 1.5% of GDP for 1999-2007 as a whole on the basis of the tax base (i.e. private consumption) applied in the disaggregated framework. These windfalls are mainly explained by VAT and by the property transfer and stamp duty taxes, which more than offset mostly negative residuals in other indirect taxes. The main driver of this development is almost certainly the boom in the Spanish housing market, with purchases of new dwellings boosting VAT receipts and secondary transactions in the housing market boosting property transfer and stamp duty taxes.

The ratio of VAT to GDP increased from 5.1% in 1998 to 6% in 2007 and, on the basis of the disaggregated framework, cumulative residuals amounted to 1.1% of GDP over this period. However, VAT is levied not only on household’s consumption, but also on government purchases of goods and services, investment, including purchases of new dwellings, and exports of tourism. If a wider proxy for the tax base is employed including these concepts, the accumulated revenue windfalls over the 1999-2007 period decline to 0.7% of GDP. This reduction is driven primarily by the inclusion of residential investment in the tax base, which on its own reduces the cumulative residuals by 0.4% of GDP. This still, however, leaves sizeable windfalls unexplained. One reason may be that when a new dwelling is purchased, VAT is levied both on the value of the land and construction, while residential investment in the national accounts only captures the latter. In addition, some improvement in tax-compliance might have taken place, as, during the period considered, the number of tax payers rose by around one-third. In order to assess this effect, the previous year’s average VAT payments can be applied to the increase in the number of tax payers. According to this methodology, such an increase would explain almost entirely the accumulated VAT residuals. However, such a result has to be interpreted with considerable care as it is difficult to say whether the increase in the number of tax payers is due to the normal course of economic activity, as opposed to a genuine increase in tax compliance.

revenue windfall over this period amounted to 1% of GDP. If instead, however, to take account of the housing boom, residential investment is used to proxy the tax base, the cumulative residuals decline significantly to just 0.2% of GDP over this period.

As regards other indirect taxes, cumulative revenue shortfalls of 0.7% of GDP are recorded for excise duties, driven mainly by the tax on hydrocarbon/oil. However, this mainly reflects that fact that these are taxes on quantity rather than value and the estimated revenue shortfall falls significantly to just 0.2% of GDP if real (rather than nominal) private consumption is employed to proxy the tax base. In the case of the local business tax (IAE) and the local tax on immovable property (IBI) revenue shortfalls/windfalls are small in magnitude.

In the context of the disaggregated framework, the revenue base for **social security contributions** is proxied by total compensation of employees, using an elasticity of 0.9. On this basis, accumulated revenue windfalls have been persistent and large, amounting to 1.9% of GDP over the whole 1999-2007 period. Residuals stem mainly from the social contributions paid by employers, which reflects the larger share of social contributions borne by entrepreneurs (30.6% of the wage) compared to that borne by employees (6.35%). In principle, the revenue base should be better proxied by total wages and salaries. However, when the latter is employed as the revenue base the residuals increase significantly to 2.5% of GDP over the period. As in the case of the IRPF, the use of affiliates instead of national accounts employment does not help reduce the unexplained residuals any further. The persistently positive residuals may indicate that the elasticity is underestimated (i.e. social contributions may not be as regressive as assumed). This suggests that some composition effects, perhaps related to the evolution of employment, might be playing a role.

In the case of **capital taxes**, employing nominal GDP as the tax base yields positive but small residuals on average.

The contribution of the housing boom to tax revenues in Ireland and Spain

The low interest rates prevailing in the euro area following the introduction of the euro entailed loose monetary conditions for Ireland and Spain, easing households' access to credit. This helped to boost demand for dwellings also leading to sharp increases in house prices. As a result, tax revenues linked to real estate transactions increased significantly and contributed largely to the improvement of the general government balance over the period from 1999 to 2006/07.

In **Ireland**, property related activities impact on four main tax heads, namely VAT, stamp duty, corporation tax and capital gains tax. VAT is levied at a rate of 13.5% on all new housing units, while stamp duty is levied upon residential property transactions and is charged on a rising scale in line with the value of the property underlying the respective transaction. The housing market impacts corporation tax receipts both via the operating profits of construction and real estate firms and capital gains made by these firms on the disposal of property assets (as capital gains are incorporated into a company's profits for corporation tax purposes). By contrast, households' capital gains are subject to capital gains tax.

During the period from 1999 until 2006, the ratios of VAT, stamp duty and capital gains tax to GDP increased by around 0.7%, 1.1% and 1.3% respectively (i.e. around 3% of GDP overall). Due to data constraints, it is difficult to estimate the contribution of the housing market to these increases. However, it is safe to assume that property-related activity accounted for most of the surge in stamp duty and capital gains tax receipts and was also a major driver of the increase in the VAT-to-GDP ratio during this period (either directly via VAT paid on new housing purchases or indirectly via wealth effects on the composition of consumption). A clear link between developments in the housing market and corporation tax receipts is more difficult to ascertain.

In **Spain**, real estate transactions also impact on both direct and indirect taxes and at least for indirect taxes the amount can be broadly quantified. Similar to the case of Ireland, VAT is levied on purchases of new dwellings while property transfer tax is levied on purchases of existing dwellings. In turn, stamp duty is levied on officially documented acts which are either formalised or have any legal or economic effect in Spain. Specifically, property transactions are estimated to explain around a 0.4% of GDP increase of VAT receipts over the period from 1999 to 2007 and a 0.8% of GDP increase in the case of property transfer and stamp duty taxes. In this latter case, an even more detailed breakdown shows that at least a 0.5% of GDP rise corresponds to the property transfer tax, whereas around 0.3% of GDP can be attributed to the stamp duty tax.

As regards direct taxes, also in Spain it is difficult to assess the impact of the housing boom on tax receipts. In the case of the IRPF, the information at hand suggests that the impact might be low. In the current legislation no income is imputed for habitual dwelling. Thus, the impact on taxes paid by households would be mainly embedded in the deduction for investment in habitual dwelling (lowering tax revenues) and, to a lesser extent, in the non-exempted part of capital gains showing up in transactions of dwellings. As for the former, the weight of the deduction has remained barely unchanged, at around 0.6% of GDP since 1999. Such stability might imply that new tax-payers applying the deduction are indeed reflecting the increase of housing prices. The 2002 tax-payers survey shows that only around 9% out of 5 million tax-payers using the deduction were constrained by its limit. This implies that for the majority the deduction could increase in line with income, if the latter determines the investment to be made, and thus in line with GDP. By contrast, for those at the limit, the deduction should lose weight in relation to GDP, offsetting the former effect partly. On the other hand, tax receipts stemming from capital gains have increased their weight in the last years, although information available from the AEAT does not allow distinguishing those due to transactions of dwellings. Nevertheless, this impact might also be reduced in that reinvested capital gains in primary residences, capital gains realised until 20th January 2006 on dwellings bought before 1987 and capital gains realised by tax-payers aged 65 or more or needing long-term care are exempt of tax. Altogether, the contribution of the housing boom to IRPF receipts is estimated to be limited.

Finally, the impact of the housing boom on direct taxes paid by enterprises can be estimated on the basis of data on taxes paid by construction and real estate firms. According to information from the Central Balance Sheet Office, the share of the corporate income tax born by these firms out of total taxes paid by enterprises would have risen by around 7 percentage points between 1998 and 2007. Extrapolating this information to the increase in total corporate income tax receipts provided by the AEAT, would imply that the activity of this group of companies would account for around a 0.3% of GDP increase of tax revenues.

Overall, therefore, the contribution of the housing boom to tax revenues in Spain over the period 1999-2007 would seem to have amounted to something in the order of 1.5% of GDP. However, given the high degree of uncertainty underlying the estimations, such figures should be interpreted with care.

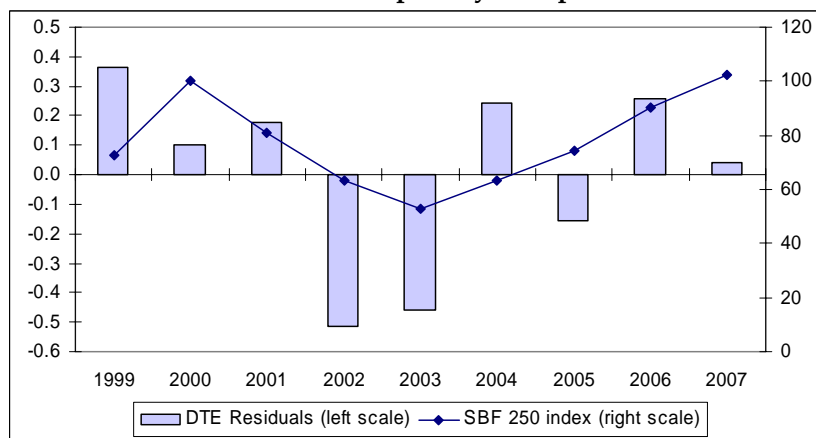
5.4. France

Like many other European countries, France has benefited from buoyant revenues in recent years, but also suffered revenue shortfalls during the previous downturn. Taking the period 1999-2007 as a whole, on the basis of the standardised tax bases used for cyclical adjustment, unexplained changes in revenues were negative (-1.7% of GDP). On the basis of a more careful selection of tax bases, unexplained changes in revenues over the period were slightly positive (+0.7% of GDP). The main difference between the two

sets of estimates concerns indirect taxes, the development of which has not been explained well by (aggregate) private consumption.

Direct taxes paid by enterprises appear as the main driver of revenue windfalls and shortfalls. Even though residuals for this tax head are low on average, they are the largest on a yearly basis. The residuals show a clear cyclical pattern with shortfalls in 2002 and 2003 offset by windfalls in “good times”. One reason for this is likely to be developments in asset prices which affect taxable gains, but which are not reflected in the tax base proxy (gross operating surplus less distributed dividends with a lag of one year). A comparison between the residuals for direct taxes paid by enterprises and the SBF 250 equity price index illustrates this relationship (see Chart FR 1). However there are also other factors at play. First, amortization mechanisms affect the actual tax base but not the proxy. Second, according to complex tax rules, firms are allowed to spread losses over several years when they estimate their yearly profit, their decision being motivated by micro-economic considerations (i.e. the desire to pay less tax or to distribute more dividends). And third, tax payments for the current year are determined on the basis of estimated profits, differences between actual and estimated profits then giving rise to positive or negative back payments in the following year. All of these factors can give rise to residuals. For example, the fact that corporate tax receipts in 2005 were less dynamic than in 2004 and 2006 would seem to be explained by an acceleration of negative back payments. In addition, effects of legislation changes are difficult to assess. Changes were introduced into the tax legislation in 2005 and 2006 in order to increase advance payments from the most profitable companies. If these measures permanently impact the collection of revenue, only their impact during the first year can reasonably be well-measured.

Chart FR 1: Residuals for direct taxes paid by enterprises and the SBF250 index



Unexplained changes in **direct taxes paid by households** are generally small. This is true on average both when the more standardised tax base underlying cyclical adjustment is used and when more refined tax base proxies are employed, although in the later case residuals are then also generally smaller on a yearly basis. In France, direct taxes paid by households consist of the personal income tax (IRPP) and the “*contribution sociale généralisée*” (CSG) both of which are taxes on a broad base of income received by households. To reflect this, the refined tax base proxies for IRPP and CSG include not only gross wages but also the gross operating surplus and mixed income of households, (gross or net) interest received, net property income and net transfers received (see appendix 1 for more details). The IRPP is paid with a lag of one year and is assessed to have an elasticity of 1.2 with respect to the tax base, while the CSG is paid on the basis of the current year’s income and is assessed to have a unit elasticity. Taking into account these other sources of income and lags thus helps to explain developments in the IRPP and CSG, but only at the margin.

France: unexplained changes in taxes and social contributions

(a) standardised tax bases

as a percentage of GDP	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	0.3	0.3	0.2	-0.8	-0.2	0.3	-0.1	0.2	-0.1	0.0	0.0	0.3
paid by enterprises, of which	0.4	0.2	0.2	-0.6	-0.5	0.2	-0.2	0.4	0.0	0.1	0.0	0.3
corporate tax	0.4	0.2	0.1	-0.5	-0.5	0.2	-0.2	0.5	0.0	0.1	0.0	0.3
withholding tax on capital income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tax on distributed profits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
paid by households, of which	-0.1	0.2	0.0	-0.2	0.3	0.0	0.1	-0.2	-0.1	0.0	0.0	0.1
IRPP	0.1	0.2	0.0	0.0	0.2	0.1	0.1	-0.2	-0.1	0.4	0.0	0.1
CSG	-0.2	0.0	0.0	-0.2	0.1	0.0	0.0	0.0	0.0	-0.5	-0.1	0.1
Other direct taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect taxes, of which	0.3	-0.5	-0.5	-0.1	-0.5	-0.2	-0.4	-0.4	-0.3	-2.4	-0.3	0.3
VAT	0.2	-0.2	-0.1	-0.2	-0.2	0.0	0.0	-0.2	-0.1	-0.9	-0.1	0.1
excise duties, of which	0.0	-0.3	-0.3	0.1	-0.2	-0.1	-0.2	-0.1	-0.3	-1.3	-0.1	0.2
energy	0.0	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.2	-0.8	-0.1	0.1
tobacco	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	0.0	0.0
alcohol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	0.0
taxes on capital and financial transactions	0.0	0.0	-0.1	0.0	0.0	0.0	-0.2	-0.1	0.0	-0.2	0.0	0.1
local business taxes	0.1	-0.1	-0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
other indirect taxes	0.0	0.0	0.1	0.0	-0.1	0.0	-0.1	-0.1	0.1	-0.1	0.0	0.0
Social contributions, of which	0.0	-0.2	-0.1	-0.1	0.4	-0.2	0.1	0.2	0.1	0.3	0.0	0.2
actual social contributions	0.0	-0.1	0.0	-0.1	0.4	-0.1	0.1	0.3	0.1	0.4	0.0	0.1
paid by employers	0.0	-0.1	0.0	-0.1	0.2	-0.1	0.1	0.2	0.1	0.3	0.0	0.1
paid by employees	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0
paid by independent workers	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0
imputed social contributions	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Capital taxes	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0
Total	0.7	-0.3	-0.3	-1.1	-0.3	0.0	-0.4	0.1	-0.3	-1.8	-0.2	0.4

(b) alternative tax bases

as a percentage of GDP	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	0.3	0.4	0.2	-0.6	-0.3	0.3	0.0	0.1	-0.1	0.3	0.0	0.3
paid by enterprises, of which	0.4	0.1	0.2	-0.5	-0.5	0.2	-0.2	0.3	0.0	0.1	0.0	0.3
corporate tax	0.4	0.1	0.1	-0.5	-0.4	0.2	-0.2	0.3	0.0	0.1	0.0	0.2
withholding tax on capital income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tax on distributed profits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
paid by households, of which	0.0	0.3	0.0	0.0	0.1	0.0	0.2	-0.2	-0.2	0.2	0.0	0.1
IRPP	0.1	0.2	0.0	0.1	0.2	0.1	-0.2	-0.1	-0.1	0.3	0.0	0.1
CSG	-0.1	0.1	0.0	-0.1	0.0	0.0	0.1	0.0	0.0	-0.2	0.0	0.1
Other direct taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indirect taxes, of which	0.1	-0.2	-0.2	0.1	-0.1	0.1	0.0	-0.2	-0.2	-0.4	0.0	0.1
VAT	0.1	0.0	0.0	-0.1	-0.1	0.1	0.0	-0.1	-0.1	-0.2	0.0	0.1
excise duties, of which	-0.1	-0.2	-0.2	0.1	-0.1	0.0	-0.1	0.0	-0.2	-0.7	-0.1	0.1
energy	0.0	-0.1	-0.1	0.1	0.0	0.0	-0.1	0.0	-0.1	-0.4	0.0	0.1
tobacco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0	0.0
alcohol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
taxes on capital and financial transactions	0.0	0.1	-0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0
local business taxes	0.1	-0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.4	0.0	0.1
other indirect taxes	0.0	0.0	0.1	0.0	-0.1	0.0	-0.1	-0.1	0.1	-0.1	0.0	0.0
Social contributions, of which	0.0	-0.1	0.0	-0.1	0.4	-0.1	0.1	0.3	0.1	0.5	0.1	0.1
actual social contributions	0.0	-0.1	0.0	-0.1	0.4	-0.1	0.1	0.3	0.1	0.4	0.0	0.1
paid by employers	0.0	-0.1	0.0	-0.1	0.2	-0.1	0.1	0.2	0.1	0.3	0.0	0.1
paid by employees	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0
paid by independent workers	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0
imputed social contributions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Capital taxes	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0
Total	0.5	0.1	0.0	-0.6	0.0	0.3	0.2	0.1	-0.2	0.5	0.1	0.2

AVE = average, ABS = average of absolute residuals

With respect to **indirect taxes**, there is a tendency to observe revenue shortfalls when employing the standardised tax base proxy (private consumption) but this is largely corrected when employing more refined tax base proxies. Residuals for VAT can largely be explained by including public consumption as well as private and public investment in the tax base. Excise duties generally exhibit negative residuals, which can probably be explained by a reducing weight of fuel, tobacco and alcohol in households' consumption basket. Residuals for other indirect taxes are generally small.

Unexplained changes in **social contributions** have been significant in some years and on average positive over the whole 1999-2007 period, driven in particular by employers' social contributions. Especially for this item, assessing the impact of legislative changes is difficult, as, among other things, social contribution rebates for low paid workers encourage companies to adopt opportunistic behaviour to take advantage of such measures. In addition, due to the numerous ceilings involved in the calculation of social contributions, the wage distribution matters for the estimation of the elasticity. Given the amount

of the wage bill, the amount of social contributions collected by public authorities may change depending on the distribution of wages and the re-evaluation of the ceilings.

In France, as in other countries, **capital taxes** consist primarily of inheritance and gift taxes paid on the transfer of capital (mostly housing) and financial assets. Residuals for these taxes are closely related to developments in asset markets but are small (reflecting the fact that capital taxes are a relatively small revenue item).

5.5. Italy

Changes in revenues not explained by discretionary measures and by the development of tax bases have been estimated using an approach very close to that of the Banca d'Italia's Public Finance Division forecasting method (the same used for ESCB fiscal projections). According to this approach, each component of direct taxes, indirect taxes and social contributions is forecast individually on an accrual basis using specific tax bases and elasticities, which in some cases differ from those employed in the ESCB cyclical adjustment and disaggregated framework methodologies. The more relevant differences concern indirect taxes.

In the period 1998-2007 the sum of changes in tax revenues and social security contributions which are not explained by discretionary measures and by the dynamics of the tax bases amounted to 0.8% of GDP. This may reflect the fact that the period covers two upturns and just one downturn. Most of these unexplained changes (0.6% of GDP) stem from direct taxes and the remainder (0.3% of GDP) from indirect taxes. Within the period, residuals have shown a cyclical pattern, being positive in the years 1998-2000, negative in the years 2001-04 and again positive thereafter. Residuals were sizeable in 2000 (+0.4% of GDP), 2002 (-0.4%), 2006 (+0.6%) and 2007 (+0.3%). Looking deeper into the data, the unexplained changes in revenues are mainly associated with the tax paid by corporations and small businesses, the local business tax, VAT and excise duties.

The analysis broadly confirms the results obtained based on the more standardised bases used in the context of the disaggregated framework methodology, although residuals are smaller as a consequence of the more accurate matching of revenue items and tax bases. Even though the pattern and overall magnitude of residuals is broadly similar, this also reflects a tendency of larger positive and negative residuals for individual series to offset each other when employing the more standardised tax bases used in the context of cyclical adjustment and the disaggregated framework.

In Italy, **direct taxes paid by enterprises** amounted to roughly 5% of GDP in 2007. They include the corporate tax, the self-assessed income tax on unincorporated businesses, the withholding tax on gains from the sale of corporate assets and the tax on dividends paid by corporations. Residuals for this category of revenue mainly reflect the failure of the assumed tax base (gross operating surplus) to adequately reflect the actual base for corporate taxation. In particular, the operating surplus overlooks losses which enterprises can carry forward to reduce tax payable in later years.³² Further difficulties stem from the way in which these taxes are paid. In Italy, an advance tax payment is made before the end of the year and taxpayers are given the opportunity to compute the tax liability choosing one of two options: i) a percentage of the previous year's tax payment; or ii) a percentage of the tax expected to be paid in the current year. Taxpayers usually behave asymmetrically. The payment in advance is made using the first option when tax liabilities are expected to be higher than the previous year. Otherwise the second option is chosen. In the period 1998-2007 the overall residual amounts to 0.3% of GDP. Residuals have been sizeable in 1998, 2000, 2002 and 2007 and are mainly related to the corporate tax. In 2007 residuals are

³² Microdata would help tackling this problem. However, available sources only make such data available with a significant lag (two years) and do not provide information which is representative of the entire population of tax payers.

by households; on the other hand, it is difficult to assess tax liabilities because actual taxable income may differ from potential. For instance, in the case of financial assets entrusted to financial intermediaries for management (so called managed savings model of taxation) taxes are collected on an accrual basis: the tax base is the net profit on the portfolio, given by the sum of capital gains/losses and income flows (interest, dividends, etc.). When capital losses are larger than income flows, they can be carried forward for many years, making the link between revenues and the tax base very difficult to ascertain.

In 2007 **indirect taxes** amounted to around 15% of GDP. Over the period 1998-2007 residuals for indirect taxes appear to show a cyclical pattern, driven in particular by unexplained changes in VAT. The positive residual for VAT of 0.2% of GDP in 2006 reflects increases in the price of oil products, and developments in the real estate market (which also explains the positive residual for taxes on capital and financial transactions). VAT windfalls may also be partly explained by a higher degree of tax compliance brought about, inter alia, by several legislative measures aimed at reducing tax evasion. In this context, the residual may be associated with: i) a shift in the composition of private consumption towards goods which are subject to higher tax rates and which, by their nature, are less exposed to tax evasion; and ii) the higher weight assumed by wholesale trade, which also reduces potential for tax evasion. Besides VAT, significant residuals are also found in particular for the tax on production activities (IRAP) and the tax on income from gambling and lotteries. IRAP is collected in the same way as corporate income taxes, thus raising estimation problems similar to those highlighted when discussing the latter. Residuals from the tax on gambling and lotteries may be due to regulatory payments related to previous years.

Social contributions accounted for more than 13% of GDP in 2007 and residuals for this revenue item are modest given its size. **Capital taxes** in Italy mainly consist of inheritance taxes, the importance of which had become almost nil in recent years, and this is reflected in insignificant residuals.

5.6. Latvia

Over the period 2000-2007 the sum of unexplained changes in tax revenues and social contributions was equal to 1.7% of GDP, exhibiting however substantial fluctuations within the period. Notably, in 2000-2002 unexplained changes in revenues were negative (totalling -2.3% of GDP), whilst during 2003-2007 the unexplained component of tax revenue growth was positive (totalling accordingly 3.6% of GDP). Unexplained changes in revenues occurred mainly in two revenue categories: direct taxes paid by enterprises and indirect taxes

In Latvia, **direct taxes paid by enterprises** consist only of the corporate income tax, which is applied to all corporate profits. The corporate income tax exhibited a shortfall of 0.5% of GDP in 2000-2002, followed by a windfall of 1.8% of GDP over the period 2003-2007. A corporate income tax reform decreased the statutory rate from 25% to 22% in 2002, 19% in 2003 and 15% in 2004. Assuming that the estimates of the direct impact of these measures on tax receipts included in the estimates are reasonable, a driving force of corporate income tax windfalls in recent years could possibly be related to entrepreneurs' incentive to legalise their profit in view of the lower tax burden on capital.

As regards **direct taxes paid by households**, (i.e. personal income tax), these are levied upon wages and salaries, the income of the self-employed, on capital income (albeit only to a minor extent as dividends and interest receipts are in general not taxed) and on old-age pensions (exceeding a certain threshold). Overall, unexplained changes in the personal income tax are irregular and relatively small (typically less than 0.1% of GDP and no more than 0.3% of GDP). As approximately 97% of personal income tax receipts come from wages and salaries, the unexplained changes mainly relate to this source of income. However, windfalls and shortfalls related to capital income have in some years amounted to as much as 0.1% of GDP (e.g. in 2000 and 2003).

Turning to **indirect taxes**, unexplained changes in VAT have been particularly important and exhibit a cyclical pattern, being negative over the 2000-2002 period (totalling -0.6% of GDP) and positive over 2003-2007 (totalling 1.5% of GDP). However within the latter sub-period there was a revenue shortfall in 2004, which could be associated with changes in the VAT payments procedure. More recent VAT windfalls might reflect tax collection improvements and a fall in the share of the shadow economy. The latter may give rise to positive residuals because private consumption in the national accounts already contains an assessment of shadow economy. A suitable alternative indicator for the VAT base could be the value of *retail trade*. Despite being incomplete and not accounting for the value of services, retail trade data has the advantage of not containing hidden transactions and could more properly reflect the change in the value of transactions taxed by VAT. This indeed seems to be the case in some years (see Chart LV-1).

Latvia: unexplained changes in taxes and social contributions

(a) standardised tax bases

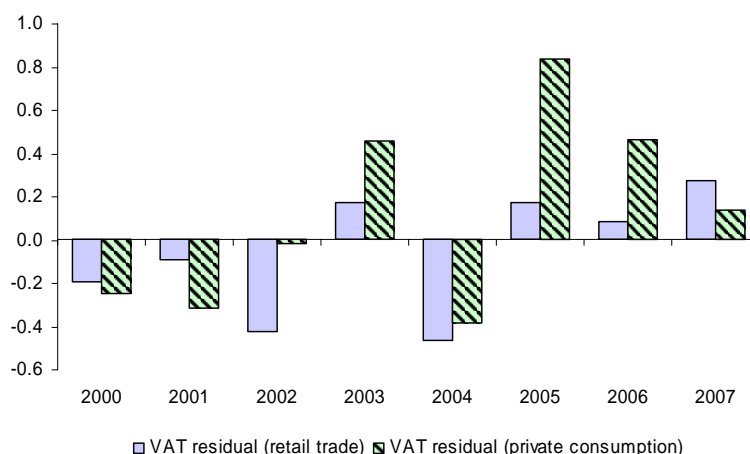
	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	-0.2	0.0	0.2	-0.2	0.9	0.3	0.3	1.0	2.2	0.3	0.4
paid by enterprises	-0.6	0.1	0.1	-0.2	0.6	0.3	0.3	0.7	1.4	0.2	0.4
paid by households, of which	0.3	-0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.4	0.1	0.1
wage tax	0.2	0.0	-0.1	0.1	0.3	0.0	0.0	0.0	0.4	0.0	0.1
tax on income of self-employed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tax on capital income	0.1	-0.1	0.1	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1
tax on transfers and pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other direct taxes	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.1
Indirect taxes, of which	-1.0	-0.5	-0.4	0.7	-0.6	0.8	0.0	0.3	-0.6	-0.1	0.5
VAT	-0.2	-0.3	0.0	0.5	-0.4	0.8	0.5	0.1	0.9	0.1	0.4
excise duties, of which	0.0	-0.3	0.1	0.2	0.0	0.2	-0.4	-0.2	-0.4	-0.1	0.2
oil products	-0.1	-0.2	0.2	0.3	0.0	0.1	-0.2	-0.2	-0.1	0.0	0.1
tobacco	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	-0.1	0.0	0.0
alcohol	-0.1	-0.1	0.0	-0.1	0.0	0.1	-0.1	0.0	-0.2	0.0	0.1
beer	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
taxes on land, buildings or other structures	0.1	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.2	0.0	0.1
other indirect taxes	-0.8	0.2	-0.4	0.1	-0.2	-0.1	0.0	0.4	-0.9	-0.1	0.3
Social contributions, of which	0.3	-0.3	0.1	-0.1	0.2	-0.1	-0.1	0.0	0.1	0.0	0.2
paid by employers and employees	0.4	-0.3	0.1	-0.1	0.2	-0.1	-0.1	0.1	0.0	0.0	0.2
paid by self-employed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
imputed social contributions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	-0.9	-0.8	-0.1	0.4	0.4	1.0	0.2	1.3	1.6	0.2	0.7

(b) alternative tax bases

	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	-0.2	0.0	0.2	-0.2	0.9	0.3	0.3	1.0	2.3	0.3	0.4
paid by enterprises	-0.6	0.1	0.1	-0.2	0.6	0.3	0.3	0.7	1.4	0.2	0.4
paid by households, of which	0.3	-0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.5	0.1	0.1
wage tax	0.2	0.0	-0.1	0.1	0.3	0.0	0.0	0.0	0.4	0.0	0.1
tax on income of self-employed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tax on capital income	0.1	-0.1	0.1	-0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1
tax on transfers and pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
other direct taxes	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.1
Indirect taxes, of which	-1.0	-0.5	-0.4	0.7	-0.6	0.8	0.0	0.3	-0.6	-0.1	0.6
VAT	-0.2	-0.3	0.0	0.5	-0.4	0.8	0.5	0.1	0.9	0.1	0.4
excise duties, of which	0.0	-0.3	0.1	0.2	0.0	0.2	-0.4	-0.2	-0.4	-0.1	0.2
oil products	-0.1	-0.2	0.2	0.3	0.0	0.1	-0.2	-0.2	-0.1	0.0	0.1
tobacco	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	-0.1	0.0	0.0
alcohol	-0.1	-0.1	0.0	-0.1	0.0	0.1	-0.1	0.1	-0.2	0.0	0.1
beer	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
taxes on land, buildings or other structures	0.1	0.0	-0.1	0.0	0.0	-0.1	-0.1	0.0	-0.2	0.0	0.1
other indirect taxes	-0.9	0.2	-0.4	0.1	-0.2	-0.1	0.0	0.4	-0.9	-0.1	0.3
Social contributions, of which	0.3	-0.3	0.1	-0.1	0.1	-0.1	-0.1	0.0	0.0	0.0	0.1
paid by employers and employees	0.4	-0.3	0.1	-0.1	0.2	-0.1	-0.1	0.1	0.0	0.0	0.2
paid by self-employed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
imputed social contributions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	-0.9	-0.8	-0.1	0.5	0.4	1.0	0.3	1.3	1.7	0.2	0.7

AVE = average, ABS = average of absolute residuals

Chart LV-1: Retails trade versus private consumption as the tax base for VAT



Looking at the main components of excise taxes, in particular receipts from the tax on oil products have been erratic with residuals in absolute terms fluctuating around 0.2% of GDP. Unexplained changes in other excise taxes (on tobacco, alcohol and beer) are generally small and would presumably be even smaller if consumption of goods to which the excise is applied rather than aggregate private consumption would be employed as the proxy for the tax base.

As to other indirect taxes the receipts from "other special target state duties" were important before 2000, when there was a drop, followed by a further decline in 2002. It is hard to say whether these reflect true revenue shortfalls as especially for this early period available information concerning the impact of legislative measures is lacking. In 2007 other indirect taxes were particularly buoyant, and this was related, among other things to the registration of ownership and legal aliens in the Land Register, which seems to be a result of different statistical treatment of the same data in different years.

As regards **social contributions**, unexplained changes in revenues have been relatively small and on average close to zero. **Capital taxes** were not recorded until 2007, when they amounted to just LVL 2.2 million. Therefore residuals are equal to zero through 2000-2007.

Overall, unexplained changes in tax revenues have been mainly driven by the corporate income tax and VAT and have evolved more or less in line with movements in the economic cycle. This suggests that either the impact of cyclical fluctuations on these tax receipts is underestimated or that other factors (e.g. tax evasion and the share of shadow economy) are not just a structural phenomenon (e.g. responding to changes in tax rates), but also depend to some extent on cyclical conditions. In addition, the ex-ante (and sometimes even ex-post) assessment of the impact of legislative changes could be under- or over-estimated, especially for the period 2000-2002 when only major changes in tax legislation have been quantified due to lack of detailed historical information. Last but not least, as regards corporate income tax receipts, as in other countries, one should bear in mind the quite complicated tax legislation with different tax allowances applied and the possibility to carry forward losses.

5.7. The Netherlands

For the Netherlands, the period 1999-2006 would appear to roughly approximate an economic cycle, while cyclical conditions in the year 2007 were favourable. Over the period 1999-2006 the sum of unexplained changes of tax revenues and social contributions is positive at 0.7 percent of GDP. Residuals

display a roughly cyclical pattern, with significant revenue windfalls in 1999 and 2000, shortfalls in the years 2002 and 2003 and again windfalls in 2004-2006. Among the revenue categories, there does not seem to be a specific driver of windfalls over the whole period 1999-2006. Direct taxes paid by corporations mainly explain the shortfalls during the economic downturn, while indirect taxes have been the most persistent driver of revenue windfalls in more recent years.

Looking in more detail, shortfalls in **direct taxes paid by corporations** were significant (-0.5% of GDP or more) in 2002 and 2003, while in 2005 a windfall of 0.3% of GDP was recorded, but in other years unexplained changes were relatively small. In the Netherlands, direct taxes paid by corporations are mostly corporation tax (*Vennootschapsbelasting* (VPB)). This tax covers all profits of a company, which makes it impossible to make a further breakdown of the revenues, for instance to distinguish between taxes on operating profits and capital gains. The possibility to compensate taxable profits for losses in earlier years creates shortfalls during the first years of an upturn.

The Netherlands: unexplained changes in taxes and social contributions

(a) standardised tax bases

as a percentage of GDP	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	-0.1	0.2	0.3	-0.6	-0.6	-0.4	0.8	0.0	0.2	-0.1	0.0	0.3
paid by enterprises, of which	-0.1	0.0	-0.1	-0.6	-0.5	0.0	0.3	0.0	-0.2	-1.2	-0.1	0.2
corporate tax (vpb)	-0.1	-0.1	0.0	-0.6	-0.5	0.0	0.3	0.0	-0.2	-1.2	-0.1	0.2
other	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
paid by households, of which	0.0	0.2	0.4	0.0	-0.1	-0.4	0.5	0.0	0.4	1.0	0.1	0.2
on wages, salaries and wealth	-0.1	0.2	0.1	0.2	0.0	-0.5	0.3	0.3	0.4	1.0	0.1	0.2
on dividends	0.3	-0.1	0.3	-0.2	-0.1	0.0	0.2	0.0	-0.1	0.2	0.0	0.2
other	-0.2	0.1	-0.1	0.0	0.0	0.0	0.0	-0.2	0.1	-0.1	0.0	0.1
Indirect taxes, of which	0.3	-0.1	-0.1	0.0	0.0	0.3	0.2	0.2	0.1	0.8	0.1	0.2
VAT	0.1	0.0	-0.2	0.2	0.0	0.1	0.0	0.2	0.3	0.5	0.1	0.1
excise taxes, of which	-0.1	-0.1	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	-0.2	0.0	0.1
fuel	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0
other mineral oils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tobacco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
alcohol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other indirect taxes, of which	0.2	0.0	0.1	-0.2	0.0	0.1	0.2	0.0	-0.1	0.4	0.0	0.1
car and motorcycle tax (bpm)	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
transfer tax (real estate)	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.0	0.0
other	0.1	0.1	0.1	-0.2	0.0	0.1	0.2	0.0	-0.1	0.1	0.0	0.1
Social contributions, of which	0.5	0.3	0.1	-0.2	-0.2	0.2	-0.6	-0.2	-0.3	-0.2	0.0	0.3
actual social contributions, of which	0.5	0.3	0.1	-0.1	-0.1	0.3	-0.6	0.0	-0.1	0.2	0.0	0.2
paid by employers	0.0	0.1	0.0	0.1	0.2	-0.1	-0.2	0.5	0.0	0.6	0.1	0.1
paid by employees	0.4	0.0	0.1	-0.2	-0.3	0.3	-0.2	-0.7	0.0	-0.5	-0.1	0.3
paid by self- and unemployed	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.1	-0.1	0.1	0.0	0.1
imputed social contributions	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.4	0.0	0.1
Capital taxes	0.0	0.0	-0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.7	0.3	0.3	-0.8	-0.8	0.2	0.4	0.0	0.0	0.4	0.0	0.4

(b) alternative tax bases

as a percentage of GDP	1999	2000	2001	2002	2003	2004	2005	2006	2007	SUM	AVE	ABS
Direct taxes, of which	-0.4	0.4	0.2	-0.4	-0.5	-0.4	0.6	0.0	0.1	-0.3	0.0	0.3
paid by enterprises, of which	-0.1	0.0	-0.1	-0.6	-0.5	0.0	0.3	0.0	-0.2	-1.2	-0.1	0.2
corporate tax (vpb)	-0.1	-0.1	0.0	-0.6	-0.5	0.0	0.3	0.0	-0.2	-1.2	-0.1	0.2
other	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
paid by households, of which	-0.3	0.4	0.3	0.2	0.0	-0.4	0.4	0.0	0.3	0.9	0.1	0.3
on wages, salaries and wealth	-0.1	0.2	0.1	0.2	0.0	-0.4	0.4	0.3	0.4	1.0	0.1	0.2
on dividends	0.0	0.0	0.2	0.0	0.0	0.0	0.0	-0.1	-0.2	0.0	0.0	0.1
other	-0.2	0.1	-0.1	0.0	0.0	0.0	0.0	-0.2	0.1	-0.1	0.0	0.1
Indirect taxes, of which	0.2	0.0	-0.1	-0.1	-0.1	0.4	0.2	0.3	0.2	1.1	0.1	0.2
VAT	0.1	-0.1	-0.3	0.0	-0.1	0.1	0.0	0.2	0.2	0.2	0.0	0.1
excise taxes, of which	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.1	0.0	0.4	0.0	0.0
fuel	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
other mineral oils	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
tobacco	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0
alcohol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
other indirect taxes, of which	0.1	0.0	0.2	-0.2	0.0	0.1	0.2	0.1	-0.1	0.4	0.0	0.1
car and motorcycle tax (bpm)	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
transfer tax (real estate)	0.0	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
other	0.1	0.1	0.1	-0.2	0.0	0.1	0.2	0.1	-0.1	0.2	0.0	0.1
Social contributions, of which	0.6	0.3	0.1	-0.2	-0.2	0.2	-0.5	-0.2	-0.2	-0.1	0.0	0.3
actual social contributions, of which	0.5	0.3	0.1	-0.2	-0.1	0.3	-0.6	0.0	-0.1	0.2	0.0	0.2
paid by employers	-0.1	0.1	-0.1	0.1	0.2	0.0	-0.2	0.5	0.0	0.6	0.1	0.1
paid by employees	0.5	0.0	0.1	-0.2	-0.3	0.3	-0.2	-0.7	0.0	-0.5	-0.1	0.3
paid by self- and unemployed	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.1	-0.1	0.2	0.0	0.1
imputed social contributions	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.4	0.0	0.1
Capital taxes	0.0	0.0	-0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.4	0.7	0.1	-0.6	-0.8	0.3	0.3	0.2	0.0	0.7	0.1	0.4

AVE = average, ABS = average of absolute residuals

Within **direct taxes paid by households**, the bulk of revenues come from the wage and income taxes. Residuals for these taxes do not show a particularly clear pattern, although there seems to be a delayed cyclical element. This may be explained by the fact that the Dutch wage cycle lags the economic cycle, due to the fact that collective contracts are negotiated for several years. It also seems to be the case that in some years there is some shift between taxes on wages and social contributions (for instance in 2005). It is hard to break down direct taxes paid by households into different sources of income because of the way they are collected. Almost all sources of income are bundled together and charged to income tax. For most taxes there is a pre-collection, which is registered separately, but all tax payments and returns that are filed at the end of the year are simply registered as income tax, which makes it impossible to attribute them to the proper tax category. For instance, taxes on wages are automatically deducted by the employers and registered as wage tax. But tax returns on wage tax due to deductible costs are registered as income tax. For this reason, only taxes on dividends are reported separately in the table. In 2001 there was a windfall on dividend taxes amounting to 0.2% of GDP. In part this was the result of a strong rise in corporate profits in the year 2000, but more importantly a change in the corporate tax made it more attractive for public companies to pay cash dividends and more attractive for the owners of private companies to shift money from the company to their private accounts.

Unexplained changes in **indirect taxes** show a clear cyclical pattern. Within indirect taxes residuals are largest for VAT, which reflects the relative weight of this tax category. Revenue windfalls for indirect taxes were significant in 2004 and 2006 (0.4% and 0.3% of GDP respectively) and driven by almost all sub-categories. It is possible to break down indirect taxes into many smaller taxes, including different excise duties, car and motorcycle tax (bpm), as well as real estate transfer tax. Details of the impact of policy measures is however not available at this level and therefore not all policy measures could be considered in the calculation. Subtracting the estimated impact of those measures would lower the estimate of revenue windfalls in 2003-2005 by around 0.2% of GDP.

Turning to **social contributions**, residuals are considerable and do not show a clear pattern. In 2005-2007 revenue shortfalls in social contributions partly offset windfalls in direct and indirect taxes. In 2006 a new health care system was introduced in the Netherlands. Among other things, this involved a large shift between social contributions paid by employers and employees. This shift in contributions seems to have been incorrectly recorded, leading to offsetting residuals in the development of social contributions paid by employers and employees. More generally, social contributions of all contributors (employers, employees and self- and unemployed) are often influenced by large policy measures, which are difficult to disentangle and may affect the estimates.

In the Netherlands, inheritance tax is the only **capital tax** that is available for individual analysis. In the Netherlands wealth (excluding housing wealth) is first netted and then taxed at a fixed rate of 1.2 percent if it is above a threshold (of about EUR 20,000). This is registered as part of the income tax on households. Inheritance tax receipts do not show a cyclical pattern, but do seem to have been affected by the large drop in share prices in 2001.

5.8. Portugal

Since the end of the 1990s and until 2005, with a halt in 2002, there was a gradual deterioration of the structural fiscal position in Portugal. Favourable economic conditions in the period from 1998 to 2001 and the decline in interest payments were not used to consolidate and few measures were implemented to curb the upward trend of government expenditure, in particular pension outlays and compensation of government employees. By the middle of 2005 there was already a consensus that a structural curbing of primary current expenditure was crucial for the correction of imbalances in the Portuguese public finances. However, the fiscal consolidation strategy set down was more revenue based and benefited

significantly from the improvement in the effectiveness of tax collection. Overall, from 1998 to 2007, the tax burden increased by 3.7 percentage points (p.p.) of GDP (of which 2.6 p.p. in 2005-2007).

The analysis of unexplained changes in tax revenues and social contributions in Portugal in the period from 1998 to 2007, presented in this subsection, is based on the alternative bases as described in section 2 of this paper.³³ However, two points should be highlighted concerning the elaboration of these estimates in the case of Portugal. Firstly, differences vis-à-vis the estimates based on the standard assessment bases underlying the ESCB cyclical adjustment and disaggregated framework methodologies occurs only in the cases of the tax on oil products (for which the volume of private consumption on non-durable goods and services was replaced by the actual quantities of petrol and diesel consumed) and of the tobacco and alcohol taxes (where private consumption of non-durable goods and services substituted private consumption). This change allowed, in particular, to explain (i.e. eliminate) some negative residuals in the tax on oil products in recent years compared to the more standardised estimates. Secondly, given the design of this exercise (based on unadjusted figures rather than cyclically adjusted figures), some elasticities used for Portugal under the ESCB cyclical adjustment methodology were not adopted, in particular in those cases where a cyclical elasticity higher than one has been derived for the computation of the cyclically adjusted balance.³⁴ Finally, some bases were attributed to items which in the ESCB methodology are not relevant for the calculation of the cyclical component of the budget balance. These are the cases of (i) interest income earned by households for final withheld amounts in direct taxes paid by households, (ii) wages and salaries of the public sector for withheld amounts on public sector wages in the context of the personal income tax, actual social contributions of the public employees subsystem and imputed social contributions and (iii) GDP for capital taxes.

In cumulative terms, total unexplained changes in tax revenues and social contributions in the 1998-2007 period are estimated to have been clearly positive, reaching 5.5 p.p. of GDP. Indeed, unexplained developments in tax revenues were nil or negative only in 2001, 2002 and 2003, showing positive values in the remainder of the years and being particularly significant in 2005 and 2007. The considerable revenue windfalls observed in these years result predominantly from gains in the effectiveness of tax administration and its impact is spread among the major revenue items.

As far as **direct taxes paid by corporations** are concerned, it is worth highlighting that, in absolute terms, the residuals were very important over the entire period (1.1 p.p. of GDP), showing an almost cyclical pattern. In Portugal, this situation reflects more the complexity of the tax code, in particular due to the deduction of previous years' losses, than the fact that other revenue sources such as capital gains are not considered in the corporate tax macroeconomic base. In addition, the evolution of receipts from this tax is frequently affected by developments in a few specific firms, which cannot be explained on the basis of macro data (see box below).

The residuals in **direct taxes paid by households** are, as a whole, very small in the period under analysis and its sign changes almost every year. A more detailed analysis was carried out, splitting the amounts related to final withholding schemes and withholding on public sector wages from the remainder (which essentially captures the withholding amounts on private sector wages net of reimbursements, which represents almost 70 per cent of overall receipts from direct taxes paid by households). With regard to the latter, it is worth highlighting the important positive windfall in 2007, which, according to the information available, was concentrated at the end of the year and stemmed essentially from an important effort of the tax administration in collecting arrears.

³³ The analysis carried out takes into account the impact of both permanent and temporary discretionary measures whenever estimates are available. In this context an adjustment was made for the extraordinary settlement in tax and social contribution arrears in 2002, as well as the impact of the securitisation of tax and social contribution debts in 2003.

³⁴ For more details, see C. Braz (2006), 'The calculation of cyclically adjusted budget balances at Banco de Portugal: an update', *Banco de Portugal Economic Bulletin*, Winter issue.

tobacco in the distribution circuits at the end of 2006, which increased considerably the receipts of the tobacco tax recorded in national accounts in that year, while dampening 2007 revenue. As regards other indirect tax receipts, unexplained changes in the tax on motor vehicles, stamp duty and the municipal taxes on real-estate property and transactions do not play an important role.

The residuals relating to actual **social contributions** to the Social Security subsystem (essentially for the private sector) reached 1.1 p.p. of GDP in the period as a whole and were positive in almost all years (both employers and employees contributions). This reflects the broadening of the base through the improvement of collection effectiveness, changing some common practices at the firms' level and settling the situation of illegal (mostly foreign) workers. The same occurred in actual social contributions to the *Caixa Geral de Aposentações* subsystem (for public employees), but justified by different factors and only as far as employers contributions are concerned, and, to a lesser extent, in imputed social contributions. Indeed, the 1.6 p.p. of GDP windfall in actual social contributions to the public employees subsystem stems from the procedure adopted in its recording in national accounts. The State contribution as an employer to this subsystem is not based on a fixed rate and broadly corresponds each year to the amount necessary to balance its accounts. As such, the positive residuals, which are also recorded on the expenditure side in compensation of employees, are a result of the strong growth in pension expenditure in the period under analysis.³⁵ The positive residuals in imputed social contributions are mostly justified by the high growth in the State contribution to the public employees' health subsystems.

Finally, **capital taxes** were not important in Portugal in the past and the inheritance and gift tax was abolished in 2004.

The use of the *Quarterly Survey on Non-financial Firms* to estimate profits

Within the context of the ESCB harmonized methodology for cyclical adjustment of the budget balance, the macroeconomic base for each of the fiscal items influenced by the economic cycle has to be necessarily a national accounts aggregate. Nevertheless, the residuals of the corporate income tax could most likely be reduced if an estimation of the profits of firms in the economy would be used instead. Having this goal in mind, an analysis of the *Quarterly Survey on Non-financial Firms* was carried out. This survey is compiled by the National Statistical Institute and sent thereafter to Banco de Portugal. It covers only a sample of firms and it is biased towards big firms, which can prove useful in the analysis of corporate income tax receipts, since they are the most important taxpayers. The variables of the survey include accounting information for earnings before taxes and taxes on earnings,^{a)} but they are only available for the years 2005, 2006 and 2007.^{b)} Table 1 shows the figures for these two variables in four situations concerning the composition of the sample (total sample, constant sample in the whole period, constant sample in 2005 and 2006 and constant sample in 2006 and 2007) to be compared with corporate income tax receipts recorded in the national accounts.^{c)}

³⁵ The replacement of wages and salaries of the public sector by pension expenditure in the public employees' subsystem as a base for actual employers social contributions of this subsystem would allow the reduction of the cumulative residual in this item from 1.5 p.p. of GDP to only 0.3 p.p. of GDP.

Table 1: Quarterly Survey on Non-financial Firms data

	2005	2006	2007
Total number of observations	3 643	3 610	3 590
Number of observations - constant sample in the whole period	2 403	2 403	2 403
Number of observations - constant sample in 2005 and 2006	2 896	2 896	-
Number of observations - constant sample in 2006 and 2007	-	2 812	2 812
Total sample			
Earnings before taxes (millions of euros)	8 488	11 257	11 738
<i>Rate of change</i>		32.6	4.3
Taxes on earnings (millions of euros)	1 672	1 637	1 756
<i>Rate of change</i>		-2.1	7.2
Constant sample (in the whole period)			
Earnings before taxes (millions of euros)	7 996	10 389	10 725
<i>Rate of change</i>		29.9	3.2
Taxes on earnings (millions of euros)	1 553	1 513	1 608
<i>Rate of change</i>		-2.6	6.3
Constant sample (in 2005 and 2006)			
Earnings before taxes (millions of euros)	8 312	10 985	-
<i>Rate of change</i>		32.2	-
Taxes on earnings (millions of euros)	1 619	1 584	-
<i>Rate of change</i>		-2.1	-
Constant sample (in 2006 and 2007)			
Earnings before taxes (millions of euros)	-	10 580	11 029
<i>Rate of change</i>		-	4.2
Taxes on earnings (millions of euros)	-	1 548	1 666
<i>Rate of change</i>		-	7.7
Average implicit tax rate:			
Total sample	19.7	14.5	15.0
Constant sample (in the whole period)	19.4	14.6	15.0
Constant sample (in 2005 and 2006)	19.5	14.4	-
Constant sample (in 2006 and 2007)	-	14.6	15.1
Corporate income tax rate (incl. the municipalities surcharge)	27.5	27.5	26.5
Corporate income tax receipts (national accounts=cash basis)	4 123	4 649	6 030
<i>Rate of change</i>		12.8	29.7

The explanation of the results requires a detailed knowledge of the corporate income tax collection procedures in Portugal. The companies must make a prepayment of the corporate income tax liability for the current tax year. It is calculated as 75 per cent (85 per cent for taxpayers with a turnover exceeding a certain limit) of the preceding tax year's corporate income tax liability and must be made in three instalments of 25 per cent (or 28.33 per cent) in July, September and December. These prepayments are creditable against the taxpayer's final corporate income tax liability, whose assessment occurs in May of the following year. As such, corporate income tax receipts recorded in the national accounts in a specific year include the settlement related with the previous year's earnings as well as the prepayments which are a percentage of last year's final tax liability. In this context, the 29.7 per cent growth observed in corporate income tax receipts in the national accounts in 2007 should, in principle, be broadly in line with the growth of taxes on earnings for the sample of non-financial firms included in the survey in the previous year. However, this is not the case, since in all sub-samples analysed, taxes on earnings in 2006 recorded an even negative rate of change (between -2.6 and -2.1 per cent). At least two factors may be relevant to explain this outcome:

- The data is incomplete since it covers only a part of the non-financial sector and taxes on earnings paid by entities of the financial sector are not taken into account. In this respect, it should be mentioned that the inclusion of the 6 biggest groups of the Portuguese banking sector would improve a lot the results, modifying the rates of change of taxes on earnings in 2006 to the 14.5-15.2 per cent range. However, in terms of coverage, this still represents less than half of the overall amount of receipts from taxes on corporate income.

- The relationship between taxes on earnings recorded in firms' accounts and corporate income tax receipts in national accounts is influenced by the possibility of suspension of the last two prepayments, which is allowed by law.^{d)} This disturbance is more significant in the case of firms which are net receivers of corporate income tax (due, for instance, to the deduction of the previous year's losses). A more detailed analysis of the survey data shows that this might have been the case in 2006, since a specific firm was entitled to receive from the State €320 million on that year's earnings (which corresponds to 0.2 per cent of GDP and almost 7 per cent of the 2006 corporate income tax receipts), but apparently did not suspend the prepayments made during the year. This would also explain why, at first glance, there is a much closer relationship between the growth of earnings before taxes in 2006 and the rate of change of corporate income tax receipts in 2007. Nevertheless, the implicit corporate income tax rate changes dramatically.

To sum up, the information on Portuguese firms' profits is incomplete, since it covers only a part of the corporate sector and only the last three years. The analysis carried over suggests that, given the collection procedures of the corporate income tax and possible factors that might be affecting its implicit tax rate, an assessment based on earnings before taxes may not be straightforward, in particular when it is difficult to find a correspondence between the evolution of corporate income tax receipts and taxes on earnings paid by a sample of firms. Nevertheless, this type of analysis is relevant to understand the evolution of corporate income tax receipts and will most likely become more important with the extension of the sample years as time goes by.

^{a)} According to accounting rules, the taxes on earnings correspond to an estimate made by firms based on taxable income, i.e. after adjusting earnings before taxes for taxation purposes.

^{b)} The data may still be subject to revisions.

^{c)} None of the alternatives concerning the composition of the sample is perfect for the purpose of comparison with general government corporate income tax receipts. On one hand, the total sample may not include results for a specific firm in some years, though still on the market, due, for example, to not replying to the survey. On the other hand, constant samples eliminate also the impact of new firms and those exiting the market, which is certainly useful for the analysis. The results, however, do not differ much.

^{d)} On the basis of agents' decisions, this might introduce an asymmetry in corporate income tax receipts developments in favourable and unfavourable economic times.

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Appendix 1

Revenue categories, tax bases³⁶ and elasticities underlying the alternative calculations

Germany

Revenue category	Tax base	Elasticity
Direct taxes, of which		
Paid by corporations, of which		
Corporation tax	Entrepreneurial income	t=0.8, t-1=0.1, t-2=0.1
Withheld on capital income	Received dividends, withdrawals and interest of corporations and private households	1
Paid by households, of which		
Withheld on wages and salaries	Employment & average wages and salaries, excluding persons in minor occupation	1 & 1.9
Withheld on capital income	Received dividends, withdrawals and interest of corporations and private households	1
Assessed income tax	Entrepreneurial income	t=1.1, t-1=0.1, t-2=0.1
Other	GDP	1
From the rest of the world	GDP, dividends and withdrawals from ROW	1
Indirect taxes, of which		
VAT	(Estimated) regular and reduced taxed private consumption, residential investment, parts of government expenditure	1
Other taxes on consumption, of which		
energy	Consumption of petrol, diesel, light fuel oil and natural gas	1
tobacco	Consumption of cigarettes and fine cut	1
alcohol & coffee	Private consumption (real)	1
other	Private consumption (real)	1
Local business taxes	Entrepreneurial income	t=0.8, t-1=0.1, t-2=0.1
Stamp taxes	GDP	
Other	GDP	1
Social contributions, of which		
Paid by employers and employees	Wages and salaries (separately for persons in minor occupations)	1
Paid to health and long-term care insurance for pensioners	Average wages and salaries	t-1=0.5, t-2=0.5
Paid by unemployment agency	Unemployment benefits	1
Other, of which	Wages and salaries	1
Imputed	Wages and salaries	1
Capital taxes	GDP	1

³⁶ Revenue bases are in nominal terms (i.e. valued at current prices) unless otherwise stated

Ireland

Revenue category	Tax base	Elasticity
Direct taxes, of which		
Paid by corporations (Corporation tax)	GDP	1
Paid by households	Employment, average compensation per employee,	1, 1.46
Capital gains tax	GDP	0.96
Indirect taxes, of which		
VAT	Sum of private consumption and lending to first-time home buyers	1
Excise duties	Consumer expenditure on tobacco, alcohol and energy	1
Stamp duty	Residential investment	1
Social contributions, of which		
Paid by employers and employees	Wages and salaries	0.89
Other	Wages and salaries	0.89
Capital taxes	GDP	1
Memo: Revenue categories, tax bases and elasticities employed in the context of the disaggregated framework		
Direct taxes paid by corporations	Gross operating surplus	1
Direct taxes paid by households	Employment, average compensation per employee	1, 1.46
Indirect taxes	Private consumption	1.04
Social contributions	Compensation of employees	0.89

Spain

Revenue category	Tax base	Elasticity
Direct taxes, of which		
Paid by corporations, of which		
Payments by instalments	Gross operating surplus of the corporate sector	1.2
Withholdings on capital income	Property income received by corporations	1.0
Other	GDP	1.0
Paid by households, of which		
Withholdings on wages and salaries	Compensation of employees and of the self-employed plus social benefits, minus social contributions	1.5
Withholdings on capital income	Property income received by households and NPISHs	1.0
Payments by instalments	Gross operating surplus and mixed income of households and NPISHs	1.0
Final net tax payable	GDP	1.0
Other	GDP	1.0
Indirect taxes, of which		
VAT	Private consumption, intermediate government consumption, gross fixed capital formation of households and general government, exports of tourism.	1.0
Hydrocarbon/oil	Private consumption (real)	1.0
Tobacco	GDP	1.0
Alcohol	Private consumption (real)	1.0
Other excise duties	GDP	1.0
Property transfer and stamp duty	Residential investment	1.0
Local Business taxes (IAE)	Gross operating surplus and mixed income	1.0
Local tax on immovable property (IBI)	GDP	1.0
Other indirect taxes	GDP	1.0
Social contributions, of which		
Actual social contributions, of which		
paid by employers	Wages and salaries	0.9
paid by employees	Wages and salaries	0.9
Other	Wages and salaries	0.9
Imputed social contributions	Wages and salaries	0.9
Capital taxes, of which		
Inheritance and gift taxes	GDP	1.0
Other capital taxes	GDP	1.0
Total		
Memo: Revenue categories, tax bases and elasticities employed in the context of the disaggregated framework		
Direct taxes paid by corporations	Gross operating surplus and mixed income	1.2
Direct taxes paid by households	Total employees, average compensation per employee	1.0, 1.5
Indirect taxes	Private consumption	1.0
Social contributions	Compensation of employees	0.9

France

Revenue Category	Tax base	Elasticity
Direct taxes, of which		
Paid by corporations, of which		
Corporate tax	Gross operating surplus - distributed interest	t-1=1,5
Withholding tax on capital income	Gross operating surplus - distributed interest	t-1=1,5
Tax on distributed profits	Gross operating surplus - distributed interest	t-1=1,5
Paid by households, of which		
Impôt sur le revenu de la personne physique (IRPP)	Gross wages, gross operating surplus and mixed income of the self-employed, net interest received by households, net property income received by general government, current and social transfers received - social contributions paid by employees and independent workers - CSG	t-1=1,2
Contribution social généralisée (CSG)	Gross wages, gross operating surplus and mixed income of the self-employed, gross interest received by households, current transfers received by households, net property income received by general government	1.0
Other direct taxes	Consumption deflator	1.0
Indirect taxes		
VAT	Private and public consumption, gross fixed capital formation	1.0
Excise duties	Gross value added	1.0
Taxes on capital and financial transactions	Gross value added	1.0
Local business taxes	Gross value added	1.0
Other indirect taxes	Gross value added	1.0
Social contributions, of which		
Actual Social contributions		
paid by employers	Wages and salaries	0.95
paid by employees	Wages and salaries	0.95
paid by independent workers	Gross operating surplus and mixed income of the self-employed	0.95
Imputed social contributions	Public wages and salaries	1.0
Capital taxes, of which		
Inheritance and gift taxes	GDP	1.0
Other capital taxes	GDP	1.0

Italy

Revenue Category	Tax base	Elasticity
Direct taxes, of which		
Paid by enterprises, of which		
Corporate tax and self-assessed income tax on unincorporated businesses	Gross operating surplus	t=0, t-1=1.0
Withholding tax on gains from sales of corporate assets	GDP deflator	1
Other	GDP deflator	1
Paid by households, of which		
On wages, salaries and pensions	Weighted average of taxable bases consisting of employment and average wages and salaries for private and public employees and number of pensioners and average amount of pensions treatments for the others	1.7
On self-employed	Number of self-employed and their average compensation	1
On capital income	GDP deflator	1
On dividends	GDP deflator	1
Other	GDP deflator	1
Indirect taxes, of which		
VAT	Consumption and imports	1
Excise duties, of which		
Energy taxes	GDP (real)	1
Tobacco	GDP (real)	1
Alcohol	GDP (real)	1
Other	GDP (real)	1
Taxes on capital and financial transactions	GDP	1
Local business taxes (IRAP)	Gross value added	t=0, t-1=1.0
Lotteries	GDP	1
Other	GDP (real or nominal depending on tax)	1
Social contributions, of which		
Actual social security contributions		
Paid by employers	Employment and average wages and salaries	1
Paid by employees	Employment and average wages and salaries	1
Imputed social security contributions	Employment and average wages and salaries	1
Capital taxes, of which		
Inheritance taxes	GDP deflator	1
Other	-	1

Memo: revenue categories, bases and elasticities employed in the context of the disaggregated framework

Direct taxes, of which		
Paid by enterprises	Gross operating surplus	t=0, t-1=1.0
Paid by households	Employment (excluding self-employed) and average wages and salaries; number of pensioners and average amount of pensions; number of self-employed and average compensation	1.6
Indirect taxes, of which		
IRAP	Wages and salaries (lagged)	t=0 and t-1=1.0
Other indirect taxes	Private consumption	1.0 / 0.9
Social contributions	Employment and average wages and salaries; number of self-employed and their average compensation	1

Latvia

Revenue category	Tax base	Elasticity
Direct taxes, of which		
paid by corporations	Net operating surplus	1
paid by households, of which		
on wages and salaries	Employment & average wages and salaries, excluding persons in minor occupations	1 & 1.2
on income of self-employed	Net mixed income	1
on capital income	GDP	1
on transfers and pensions	Old-age pensions	1
other	GDP	1
Indirect taxes, of which		
VAT	Private consumption	1
Excise taxes	Private consumption (real)	
Taxes on land, buildings or other structures	GDP	1
Other indirect taxes	GDP	1
Social contributions, of which		
paid by employers and employees	Employment & average wages and salaries	1
paid by self-employed	Net mixed income	1
Imputed social contributions	Employment & average wages and salaries	1

The Netherlands

Revenue category	Tax base	Elasticity
Direct taxes, of which		
Paid by corporations, of which		
corporate tax (vpb)	Gross operating surplus	1.0
other		
Paid by households, of which		
on wages and salaries and wealth	Employment, average wages and salaries	1,0;1,1
on dividends	Dividends received by households	1.0
other taxes	Employment, average wages and salaries	1,0;1,1
Indirect taxes, of which		
VAT	Household + government consumption	1.0
Excise taxes, of which		
fuel	Consumption of fuel (volume index)	1.0
other mineral oils	Consumption of fuel (volume index)	1.0
tobacco	Consumption of tobacco (volume index)	1.0
alcohol	Consumption of alcohol (volume index)	1.0
other	Consumption (volume index)	1.0
Other indirect taxes, of which		
Car and motorcycle tax (bpm)	New sales of personal transport vehicles, price index of new car sales	1,0;1,0
Transfer tax (real estate)	Number of house purchases, average house price	1,0;1,0
Other	Household consumption	1.0
Social contributions, of which		
Actual social contributions, of which		
paid by employers	Employment, average wages and salaries	1,0;0,7
paid by employees		
paid by self- and unemployed		
Imputed social contributions		
Inheritance tax	GDP, number of deaths	1,0;1,0

Portugal

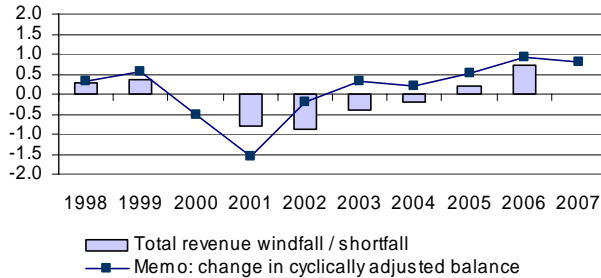
Revenue category	Tax base	Elasticity
Direct taxes, of which		
paid by corporations	Private GDP (= gross value added at market prices minus compensation of government employees – government consumption of fixed capital)	1
paid by households		
final withheld amounts	Interest income (deposits and saving certificates) received by households	1
withheld amounts on public employees wages	Public employment and average public wages and salaries	1 & 1.69
other	Private employment and average private wages and salaries	1 & 1.69
Indirect taxes, of which		
VAT	Private consumption	1
excise duties, of which		
energy (tax on oil products)	Quantities of petrol and diesel consumed	1
tobacco	Private consumption of non-durable goods and services	1
alcohol	Private consumption of non-durable goods and services	1
tax on motor vehicles	Private consumption of durable goods	1
stamp duty	Private consumption	1
municipal tax on real-estate	Private consumption	1
municipal tax on real-estate transactions	Private consumption	1
other indirect taxes	Private consumption	1
Social contributions, of which		
Actual social contributions, of which		
Social Security subsystem, of which		
employers social contributions	Wages and salaries of the private sector	1
employees social contributions	Wages and salaries of the private sector	1
other social contributions	Wages and salaries of the private sector	1
<i>Caixa Geral de Aposentações</i> (public employees) subsystem, of which		
employers social contributions	Wages and salaries of the public sector	1
employees social contributions	Wages and salaries of the public sector	1
Imputed social contributions	Wages and salaries of the public sector	1
Capital taxes	GDP	1
<p>NB: In the case of Portugal the tax bases and elasticities applied in the “standardised” calculations are the same as those indicated above except for:</p> <ul style="list-style-type: none"> - Energy tax (tax on oil products): private consumption of non-durable goods and services (volume) - Tobacco and alcohol: private consumption 		

Appendix 2

Charts

Germany: Unexplained changes in taxes and social contributions (% of GDP)

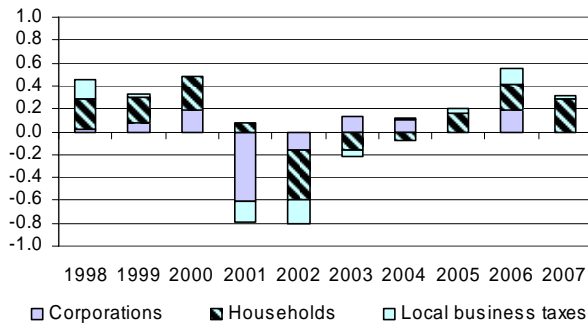
(a) Total revenue windfalls/shortfalls



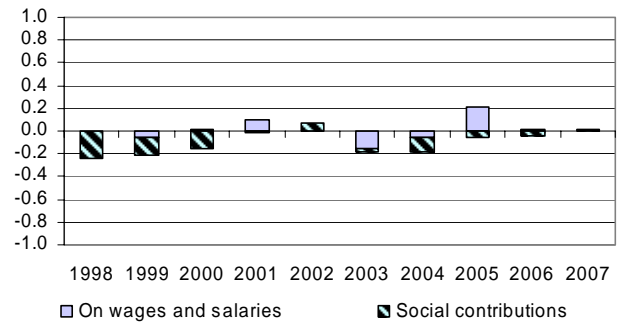
(b) Breakdown between "profit-related" taxes and "other"



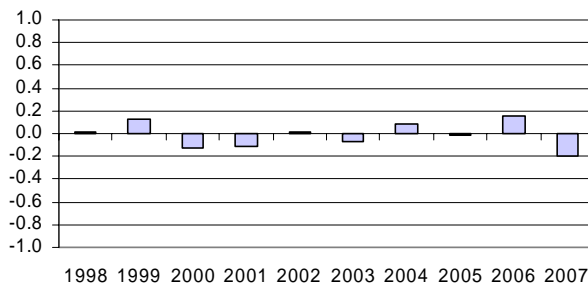
(c) Breakdown of profit-related taxes



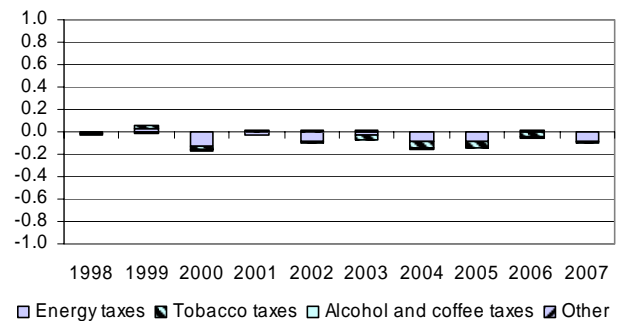
(d) Taxes on wages and salaries and social contributions



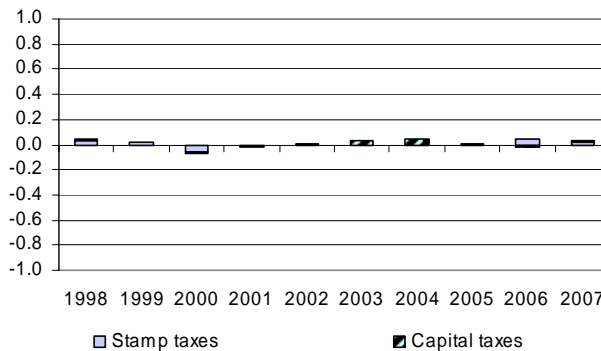
(e) Value-added-tax



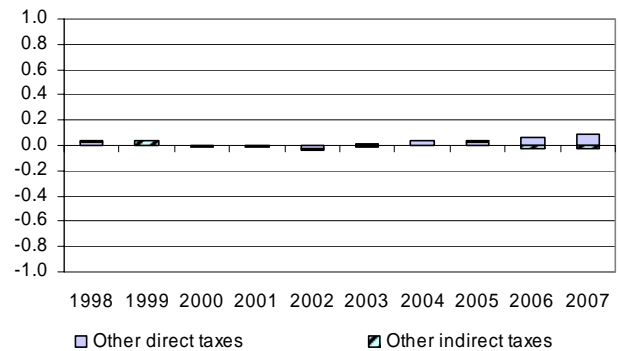
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



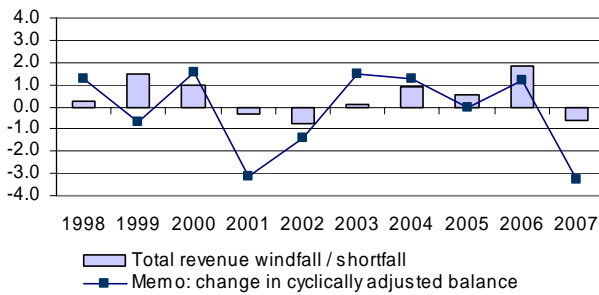
(h) Other direct and indirect taxes



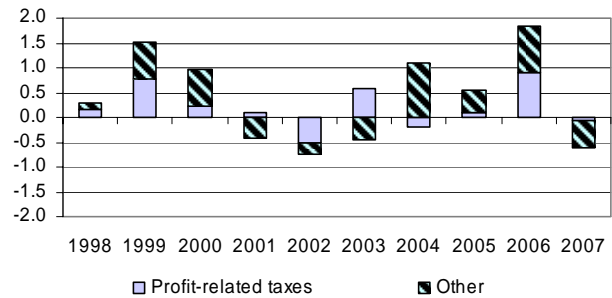
NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

Ireland: Unexplained changes in taxes and social contributions (% of GDP)

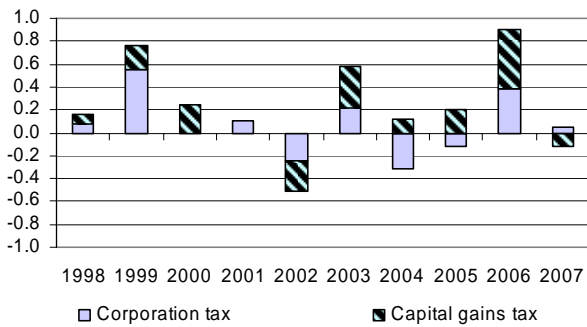
(a) Total revenue windfalls/shortfalls



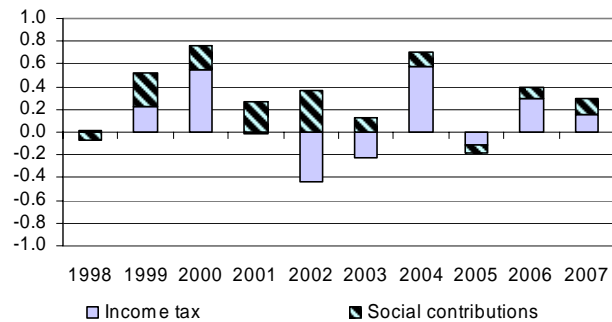
(b) Breakdown between "profit-related" taxes and "other"



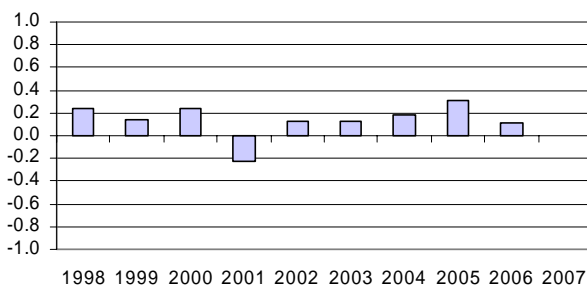
(c) Breakdown of profit-related taxes



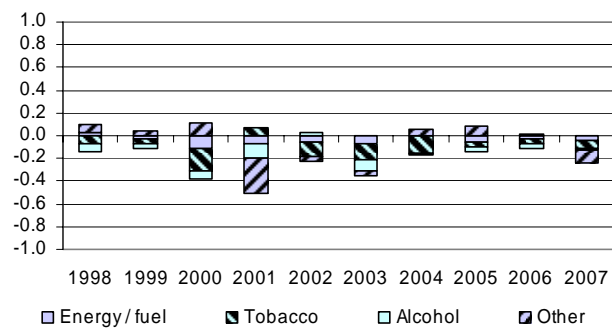
(d) Income tax and social contributions



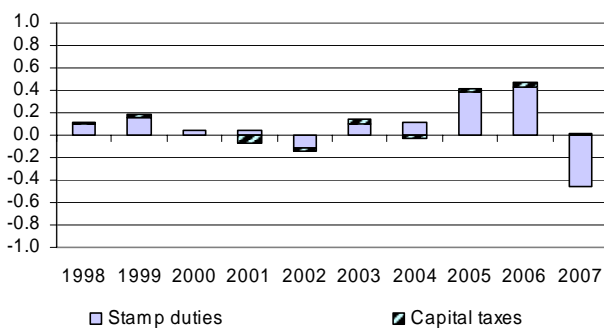
(e) Value-added-tax



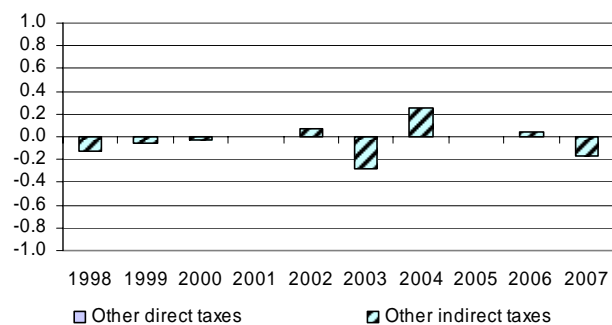
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



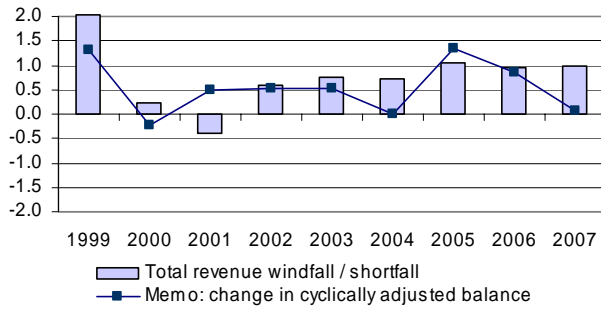
(h) Other direct and indirect taxes



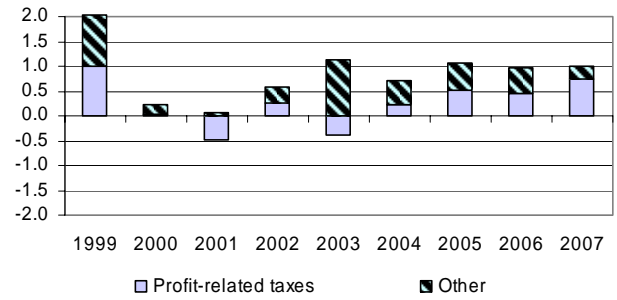
NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

Spain: Unexplained changes in taxes and social contributions (% of GDP)

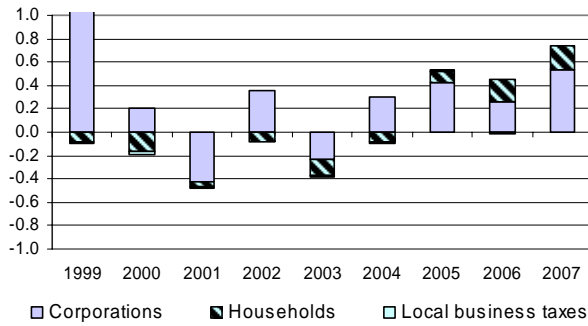
(a) Total revenue windfalls/shortfalls



(b) Breakdown between "profit-related" taxes and "other"



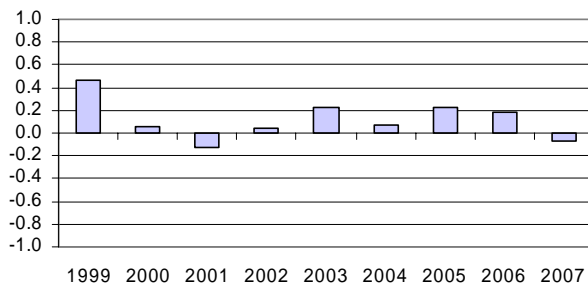
(c) Breakdown of profit-related taxes



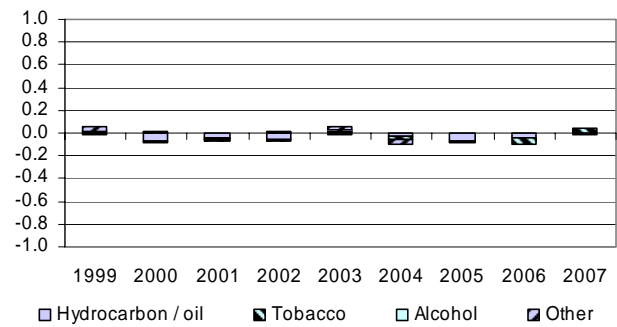
(d) Taxes on wages and salaries and social contributions



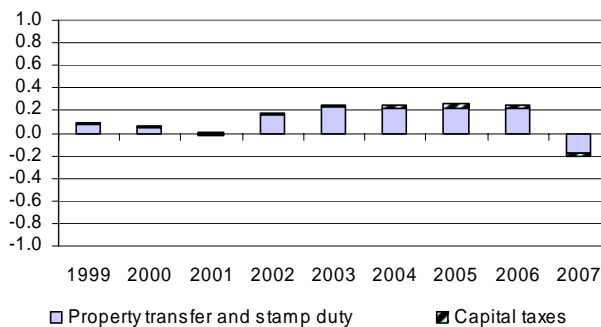
(e) Value-added-tax



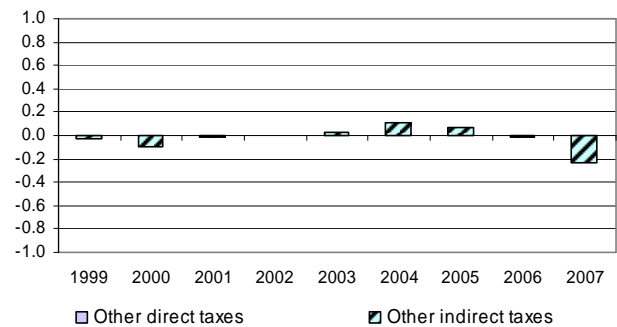
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



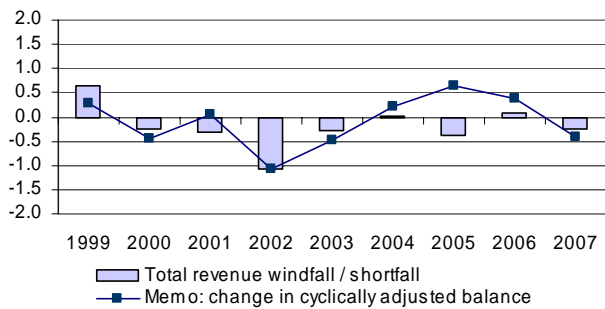
(h) Other direct and indirect taxes



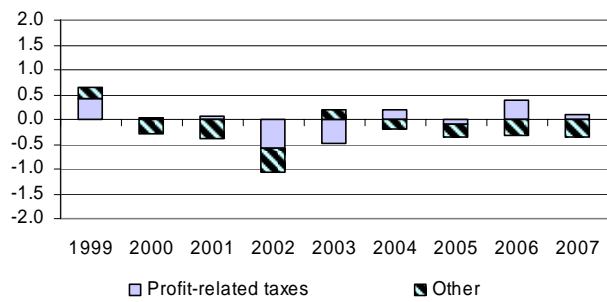
NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

France: Unexplained changes in taxes and social contributions (% of GDP)

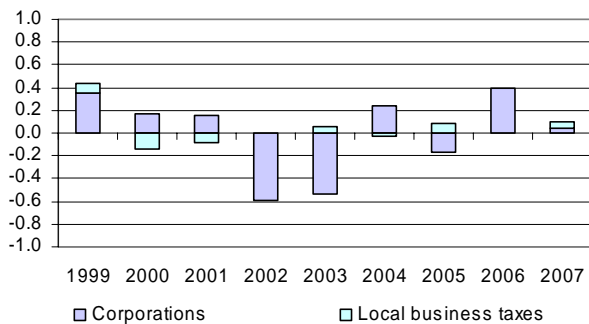
(a) Total revenue windfalls/shortfalls



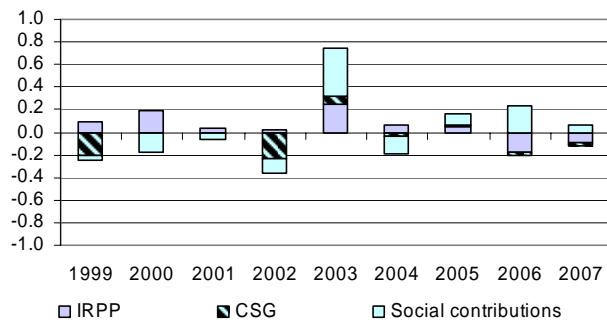
(b) Breakdown between "profit-related" taxes and "other"



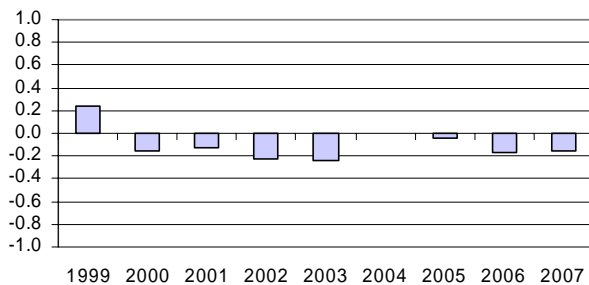
(c) Breakdown of profit-related taxes



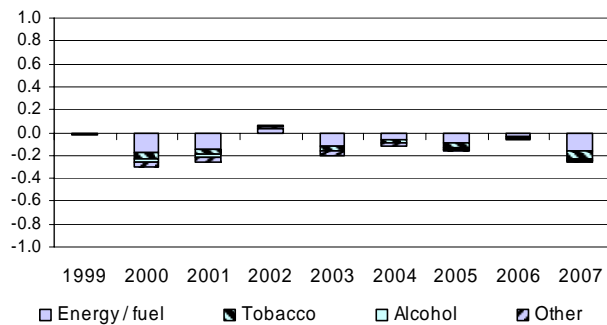
(d) IRPP, CSG and social contributions



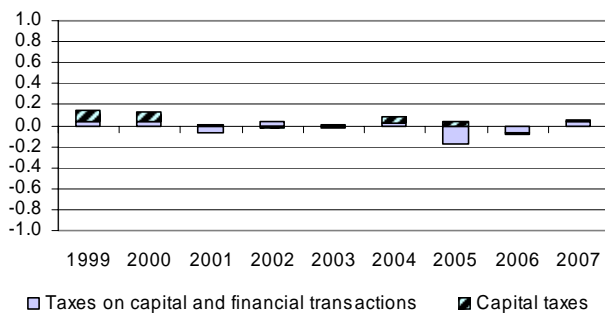
(e) Value-added-tax



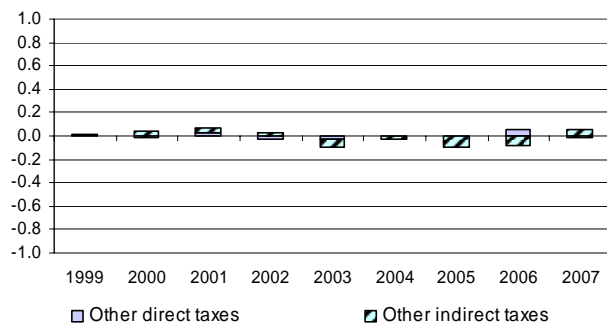
(f) Excise duties/other consumption taxes



(g) Taxes on capital and financial transactions and capital taxes



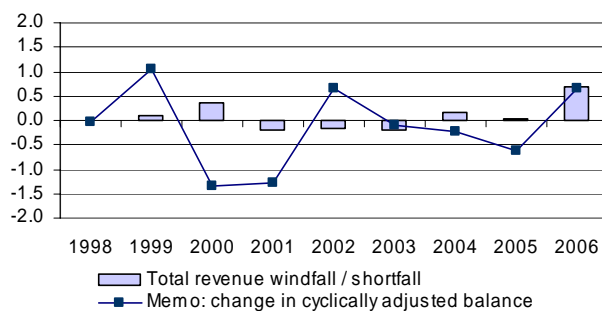
(h) Other direct and indirect taxes



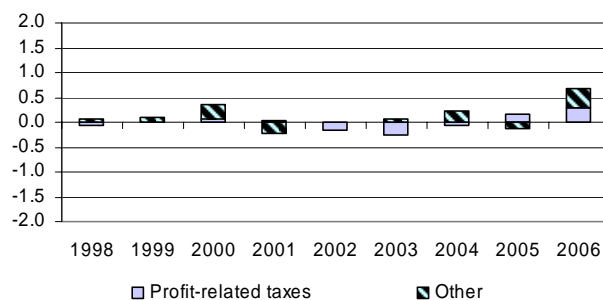
NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

Italy: Unexplained changes in taxes and social contributions (% of GDP)

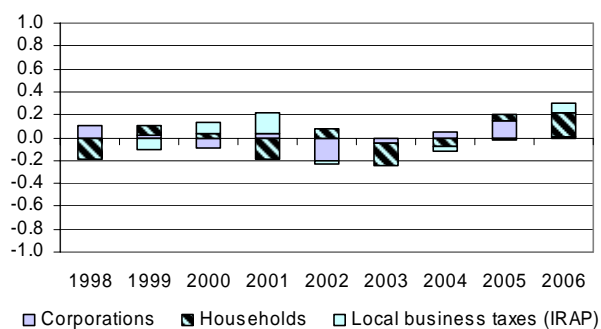
(a) Total revenue windfalls/shortfalls



(b) Breakdown between "profit-related" taxes and "other"



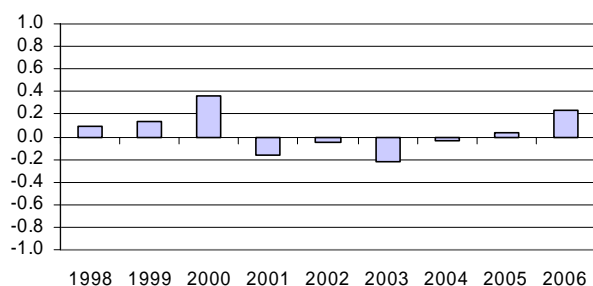
(c) Breakdown of profit-related taxes



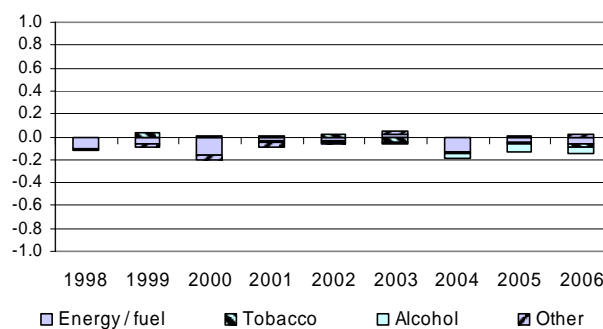
(d) Taxes on wages and salaries and social contributions



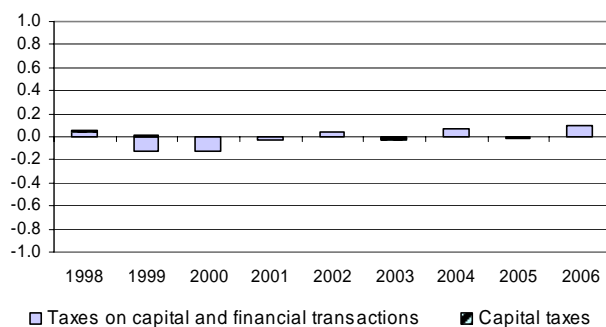
(e) Value-added-tax



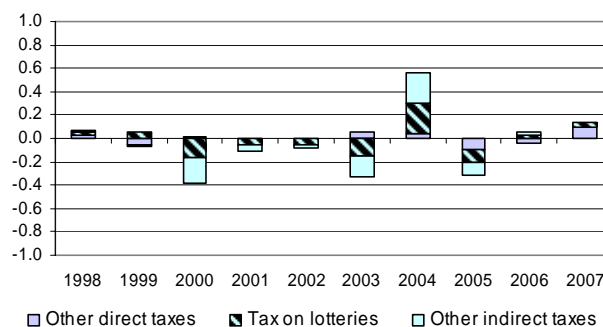
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



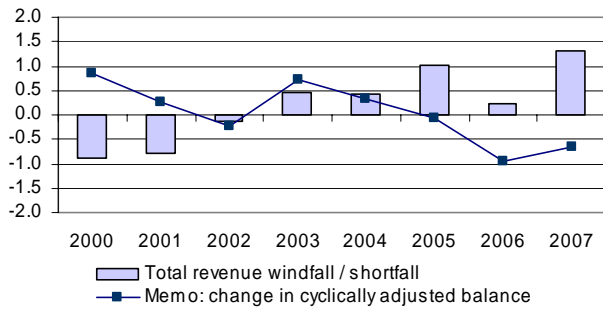
(h) Other direct and indirect taxes



NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

Latvia: Unexplained changes in taxes and social contributions (% of GDP)

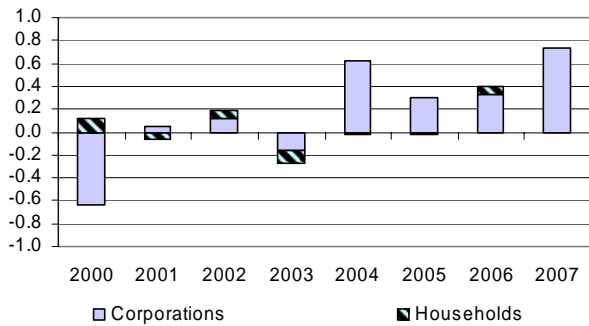
(a) Total revenue windfalls/shortfalls



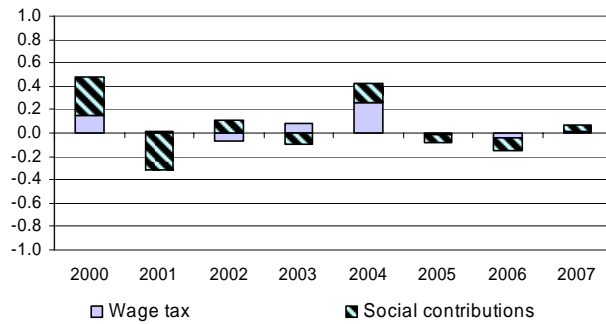
(b) Breakdown between "profit-related" taxes and "other"



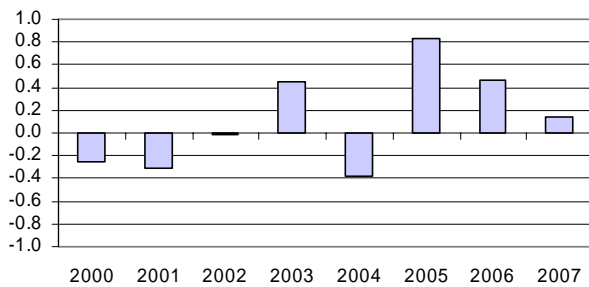
(c) Breakdown of profit-related taxes



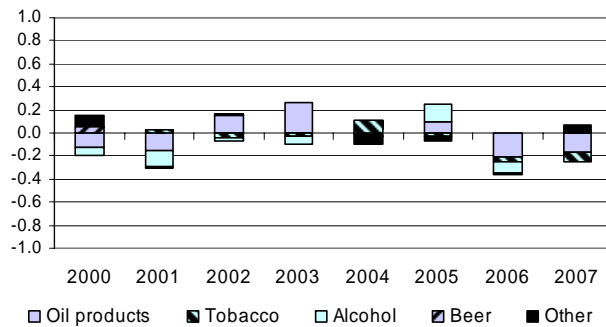
(d) Taxes on wages and salaries and social contributions



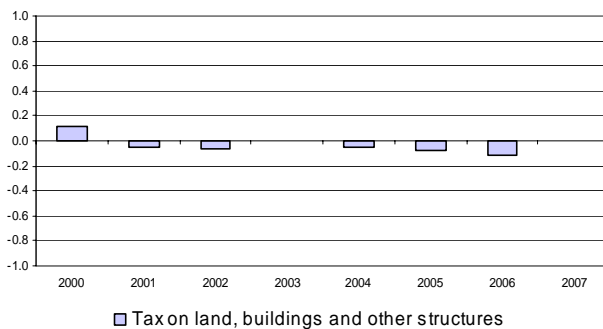
(e) Value-added-tax



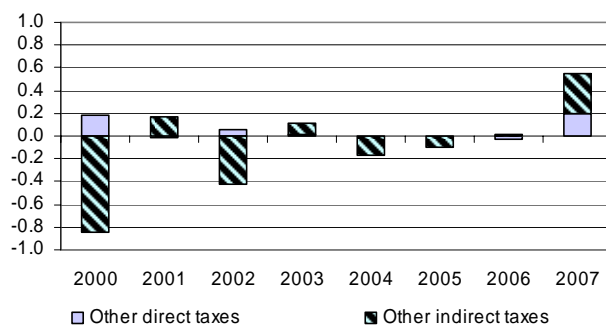
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



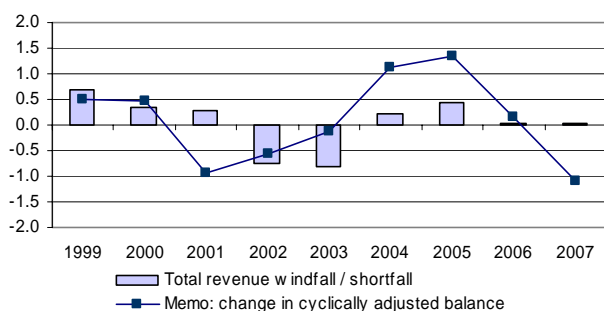
(h) Other direct and indirect taxes



NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

The Netherlands: Unexplained changes in taxes and social contributions (% of GDP)

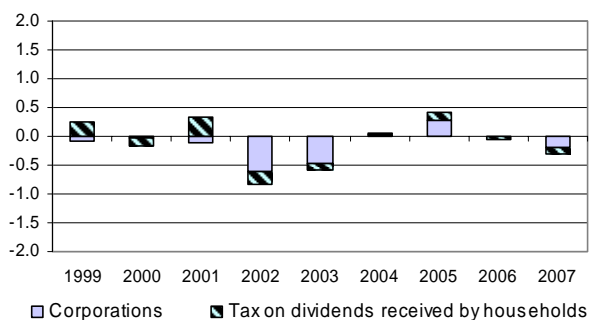
(a) Total revenue windfalls/shortfalls



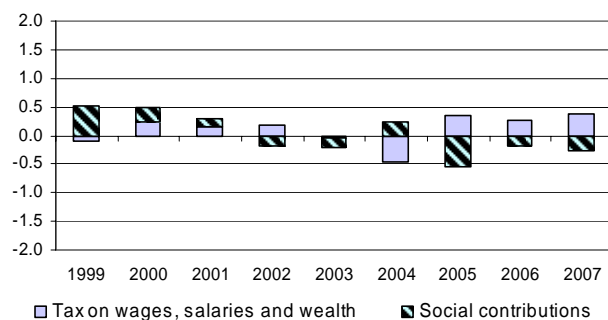
(b) Breakdown between "profit-related" taxes and "other"



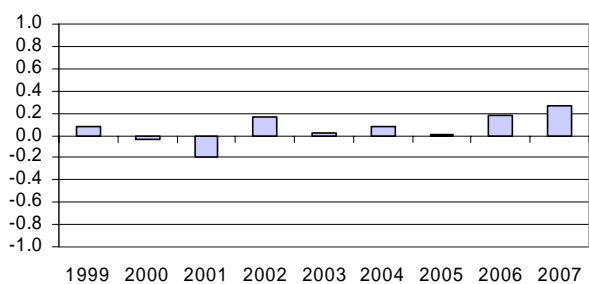
(c) Breakdown of profit-related taxes



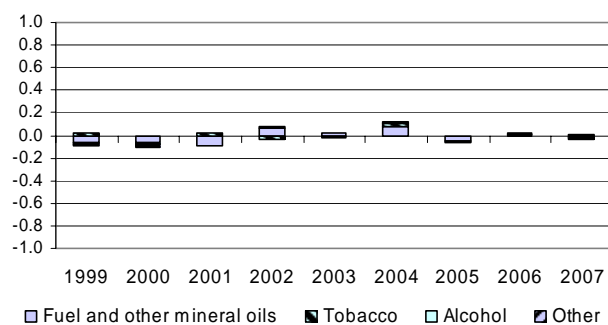
(d) Taxes on wages and salaries and social contributions



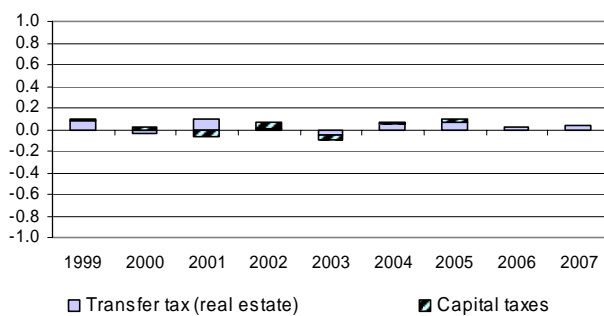
(e) Value-added-tax



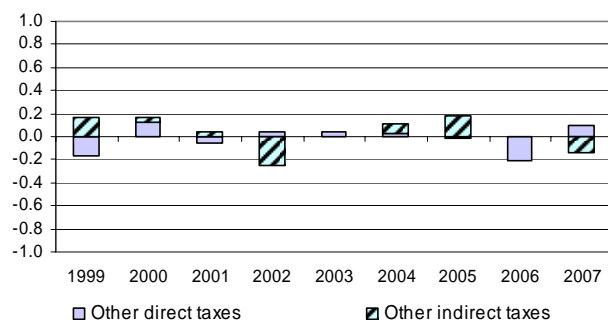
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



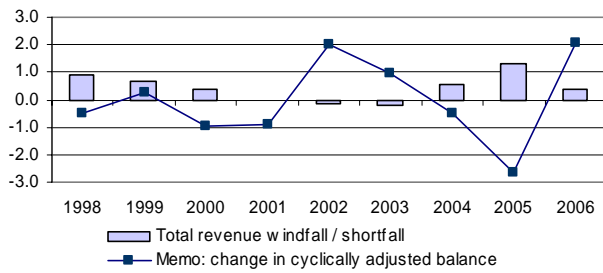
(h) Other direct and indirect taxes



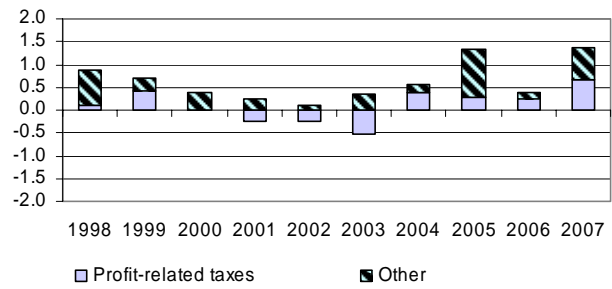
NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

Portugal: Unexplained changes in taxes and social contributions (% of GDP)

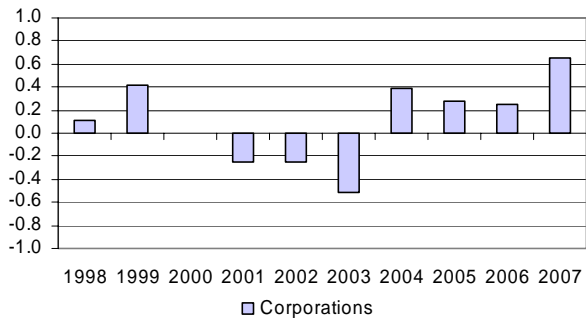
(a) Total revenue windfalls/shortfalls



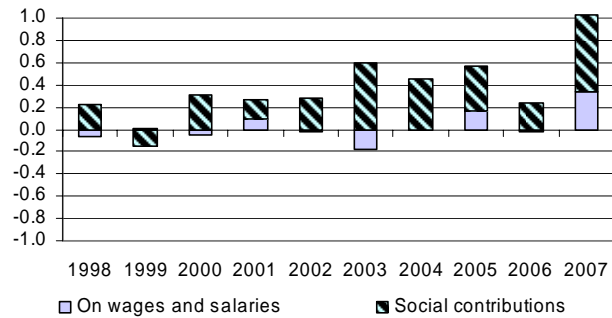
(b) Breakdown between "profit-related" taxes and "other"



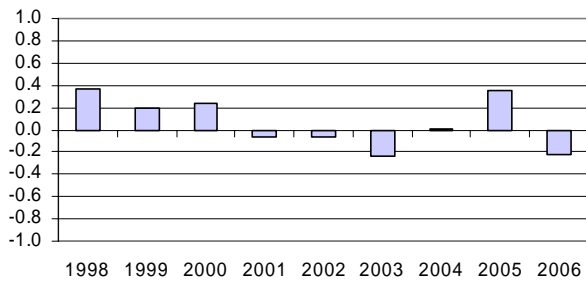
(c) Breakdown of profit-related taxes



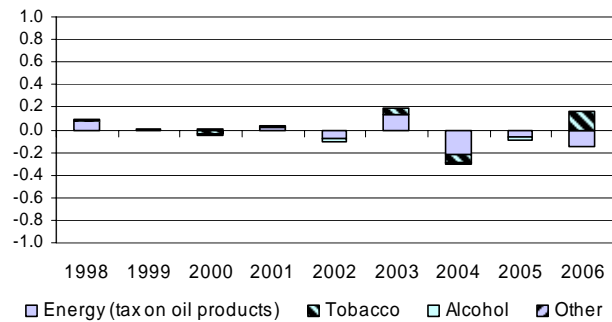
(d) Taxes on wages and salaries and social contributions



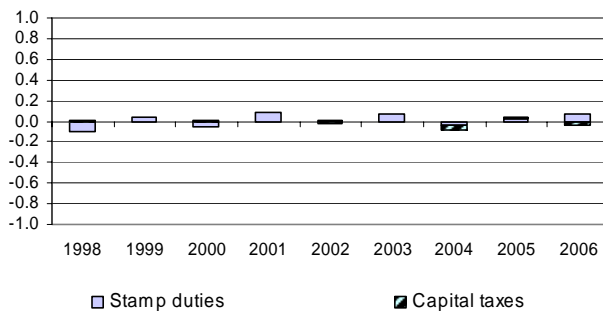
(e) Value-added-tax



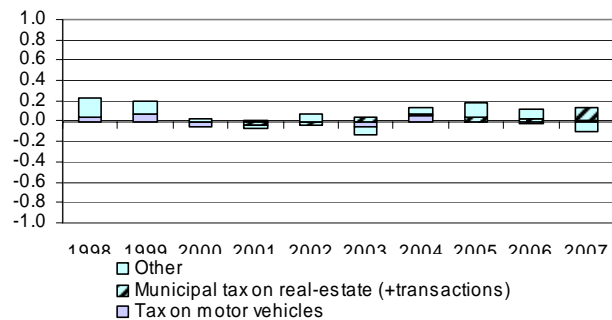
(f) Excise duties/other consumption taxes



(g) Stamp duties and capital taxes



(h) Other direct and indirect taxes



NB: Change in cyclically adjusted balance in panel (a) is net of proceeds from the sale of UMTS licenses

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