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Elasticity of compulsory levies to GDP: definition, interpretation and limits

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Summary

The elasticity of a compulsory levies (CL) with respect to its base measures how much this levy increases when the taxable base increases by 1%, *in the absence of any new measure on the base or rates. Except in the case of a strictly proportional tax, this elasticity is not necessarily unitary (i.e. equal to 1) or even constant, may be delayed over time, and may vary according to changes in the composition of its base.*

By analogy, and although GDP is not directly the base of any compulsory levy, it is possible ***to define the elasticity of CLs with respect to GDP as the growth in CLs associated with a 1% increase in GDP, at a given taxes legislation****: empirically, the spontaneous growth rate of CLs, i.e. at a constant level of legislation, appears to be well correlated to that of GDP. Indeed, many taxable bases (wage bill, household consumption, income, etc.) are important determinants of GDP. However, the link between the growth rate of compulsory levies and the GDP growth rate is not perfect: not all tax bases grow at the same rate, some taxes are progressive and not proportional to the tax base or even are delayed.*

The elasticity of compulsory levies is a synthetic indicator that measures the deviation from a spontaneous increase in the CLs equal to that of activity. *This reference is very useful for summarising the forecast of compulsory levies at an aggregate level, but it does not, on its own, make it possible to judge the exceptional nature of a change in the CLs, either in the past or in a forecast, for example when the HCFP is called upon to pronounce on the realism of the revenue forecasts.*

Thus, the analyses carried out in this note suggest that this elasticity should be used with the utmost caution to detect the possible abnormal nature of an evolution or a forecast of compulsory levies:

- *Firstly, the elasticity measured in this way is not the right metric for analysing the relationship between spontaneous CLs growth and the GDP growth rate; both theory and empirical tests show that the right quantity to analyse is the gap between these growth rates (or more precisely between the spontaneous CLs growth rate and the GDP growth rate slightly dilated by a coefficient of 1.07);*

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- *secondly, although the spontaneous growth rate of CLs and that of GDP are well correlated, empirical tests show that, even with the introduction of only macroeconomic variables, other explanatory variables, such as the growth rate of private sector wages, leads to a to significant improvement in the explanation of the spontaneous CLs evolution, thus leading to a modification for certain years of the diagnosis based solely on GDP growth;*

- *thirdly, even if the relationship thus obtained has good statistical properties, it cannot by itself capture the great diversity of tax bases and consider the evolution of legislation over time.*

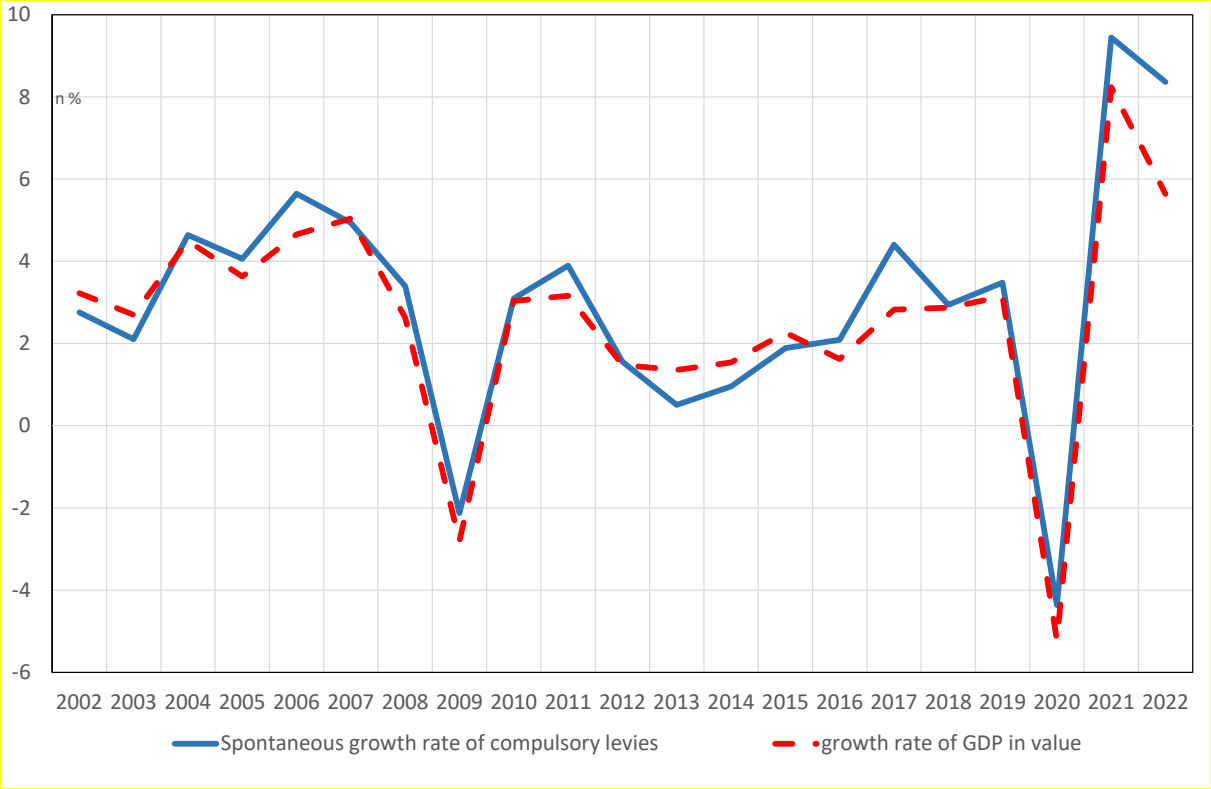
Consequently, a high or low elasticity of compulsory levies with respect to GDP growth is not necessarily a sign of an abnormal evolution of compulsory levies, and, conversely, an elasticity of compulsory levies with respect to growth GDP close to 1 does not necessarily mean that the forecast is correct.

It is therefore necessary to analyse the evolution of the main CLs according to their own tax base and the legislation in force, in view of the macroeconomic scenario.

Reference is often made, particularly in the work of the Government, the Cour des Comptes or the High Council of public finance, to the elasticity of compulsory levies (CLs) with respect to GDP, measured as the ratio between the spontaneous growth rate (i.e. at constant legislation) of CLs and the GDP growth rate.

This is based on the observation that, on average, once changes in legislation likely to affect CLs are neutralised (variation in VAT rates, increase in tobacco taxes, abolition of the housing tax, etc.), the latter grow in line with GDP (see graph 1).

Graph 1: 'Spontaneous' growth rate of compulsory levies and growth rate of GDP in value



Source: Author's calculations, based on INSEE and Government data (see Annex 1 for details on the construction of the spontaneous growth rate of CLs)

The purpose of this note is in a first part to explain the notion of elasticity of a CL with respect to its base, then to extend the analysis to the elasticity of CLs to GDP, presenting the foundations and discussing the limits. Finally, the note discusses the use that can be made of it to re-read the past and analyse forecasts, for example in the context of the opinions that the HCFP must give on the government's forecasts.

I. The elasticity of a tax levy to its base

The elasticity of a tax levy to its base represents the percentage increase in the tax revenue, at unchanged legislation, when its base increases by 1%.

In the case of a flat tax[2], the tax is proportional to its base: it therefore increases strictly as its base and the tax elasticity to its base is equal to 1.

In France, many taxes, known as progressive taxes, have rates that increase with the value of the base: this is the case in particular for income tax, wealth tax or estate-type transfer tax.

Some tax rules move many taxes away from the strict application of a proportional rate, in particular through tax reduction (income tax, wealth tax, etc.) and tax decrease or credits (income tax, corporation tax, etc.).

Some taxes have different rates depending on the nature of the base. This is the case, for example, of the value added tax (VAT), which has standard and reduced rates, and of the domestic consumption tax on energy products (TICPE), whose rate is differentiated according to the type of fuel consumed.

In the case of a "pure" flat tax (single proportional rate applicable to the entire tax base without any allowance or reduction), the elasticity is constant and equal to 1. In other cases, the tax elasticity is not a constant, but depends on the evolution of its base. For example, if we take a tax such as VAT which its rate depends on the nature of the goods purchased, it is therefore easy to show that VAT will grow less quickly than the base if the growth of the tax base for goods and services to which reduced rates apply is greater than for others goods and services: the elasticity will then be less than 1. Conversely, the elasticity will be greater than 1 if the base growth is greater for goods with a higher rate of VAT than for goods with a reduced rate.

We can illustrate this result with a very simple example: let us consider a tax (for example a VAT) with two rates: one of 5% (reduced rate) and the other of 20% (default rate) respectively on two bases A and B of identical amount (€1bn). The initial tax is therefore €0.25bn (0.05 x 1+0.2 x 1) and the initial average rate is equal to half of the reduced and standard rates, i.e. 12.5%.

Let's assume that the tax base increases by 10% (i.e. by €0.2bn) and examine the elasticity obtained in a case where the two bases A and B each increase by €0.1bn (case 1) and two polar cases where, for the same growth in the overall base, only base A (case 2) or base B (case 3) increases by €0.2bn.

It can then be seen (see Table 1) that the elasticity varies between 0.4 and 1.6 depending on whether it is base A or base B that increases.

[2] Assuming that there is no collection problems and the flat tax is collected at 100% in the year of taxation.

Table 1: Illustrative calculation of the elasticity of the tax to its tax base

	Case 1	Case 2	Case 3
Base A (1)	1.1	1.2	1.0
Base B (2)	1.1	1.0	1.2
Tax on A (3) = 5% x (1)	0.055	0.06	0.05
Tax on B (4) = 20% x (2)	0.22	0.2	0.24
Total tax (5) = (3) + (4)	0.275	0.26	0.29
Tax growth rate (6) = (5)/0.25-1	10%	4%	16%
Elasticity = (6)/10	1	0.4	1.6

This example illustrates that, even when tax legislation does not change, the elasticity of the tax with respect to its tax base can vary according to its growth composition.

The more complex the tax (such as income tax with its many rates, progressivity, tax cuts and credits), the less constant the elasticity will be over time.

II. The CLs elasticity to GDP: foundations and limits

Given the diversity of tax bases and scales in France, there is no simple macroeconomic quantity that is representative of the average tax base. GDP itself is not directly the base of any tax, but its components are in various ways related to the tax bases, which explains the link shown in Figure 1.

2.1 GDP is not the tax base for CLs, but some components of GDP are.

GDP can be defined according to three approaches, based on output, income and expenditure respectively.

In the production approach, GDP is the sum of gross value added of all the production activities of goods and services, plus taxes less subsidies on products: GDP directly includes the revenue from all taxes on products, and in particular VAT, while the value added of companies is the basis for the value-added contribution (CVAE) and enters into the determination of the corporate tax.

In the demand approach, GDP is the sum of the final uses of goods and services minus the value of imports: it includes part of the VAT base (on consumption and investment).

In the income approach, GDP includes income from activity (wages and contributions, gross operating surplus), taxable for income tax, corporate tax, subject to social contributions and social levies (CSG-CRDS).

2.2 Several limitations suggest a very imperfect link between the spontaneous growth rate of CLs and GDP

While, in view of the last paragraphs, some tax bases are expected to be well correlated with GDP, a number of factors suggest that the relationship between the spontaneous growth rate of CLs and the GDP growth rate is likely to be variable.

First of all, some taxes have a base that is at least partly shifted by one year: this is the case for the value-added contribution, which is based on the value added of the previous year; it is also the case for income tax and corporate tax, the final amount of which can only be calculated once the year to which they relate has passed. Moreover, this time lag is not constant over time, as the contemporaneity of the tax has tended to increase over time, with the switch to the withholding of income tax in 2019 and the successive extensions of the "5th instalment" of corporate tax, based on the estimate by large companies of their results for the current year.

Secondly, some taxes have a base that is difficult to link to GDP: this is the case for wealth tax (solidarity tax on wealth and then tax on real estate wealth) and, to a lesser extent because they can be linked to the activity of notaries, transfer duties.

Finally, given the number and diversity of taxes and their tax rates in France, the same change in GDP may cover different growth rates of taxable bases which are themselves subject to different tax rates: even in the case where taxable bases growing faster than GDP would be compensated by those with slower growth[3], the difference in their effective tax rates may significantly deviate the growth rate of all CLs from that of GDP.

III. Empirical link between spontaneous growth of CLs and GDP growth

In order to test the robustness of the link between spontaneous CLs growth and GDP growth, this section performs a number of econometric tests. First, a simple relationship between the spontaneous growth rate of CLs and the growth rate of GDP is estimated. Next, econometric tests are carried out to determine whether it is relevant to reason on the gap between GDP and CLs growth or on the elasticity of CLs to GDP growth. Additional explanatory variables are then tested. Finally, we examine how these estimation results allow us to analyse the evolution of the CL in 2020 and 2021 and in the government's forecast for 2022 associated with the 2023 Finance Bill.

3.1 A basic regression leads to an apparently satisfactory relationship between the growth rate of CLs and the growth rate of GDP

Given the limitations outlined in the previous section, there is every reason for the link between CLs growth rate and GDP growth rate to fluctuate. However, as expected from the introductory graph 1, this link is econometrically relevant (see Table 2)[4]: over the period 1991-2021, GDP growth is highly significant and the share of variance explained by the GDP growth rate is high (R^2 of 0.88). The relationship passes all five standard specification tests[5], thus revealing neither the absence of an important explanatory variable nor instability over time. Finally, the constant introduced in equation (1) to capture a possible autonomous trend in compulsory levies independently of growth proves to be insignificant (see table 2). A better

[3] In particular because certain tax bases affect certain CLs in opposite directions (e.g. the wage bill in the private sector, which has a positive effect on contributions or income tax but a negative effect on corporation tax).

[4] All the econometric estimations presented in this note were carried out with version 1.84 of the Grocer toolbox for Scilab (E. Dubois and E. Michaux (2019): "GROCER 1.8: an econometric toolbox for Scilab", available at http:// grocer.toolbox.free.fr/grocer.html).

[5] The econometrician David Hendry has put forward these tests in a number of articles devoted to time series regression.

relationship is then obtained by removing the constant[6] and thus an average elasticity of 1.07 is obtained (see equation (2) in the table), which is however statistically not different from unity.

All in all, the relationship obtained appears satisfactory and seems to justify its use to analyse a forecast of compulsory levies. However, as we shall see below, GDP is not the only macroeconomic variable that can contribute to the economic explanation of the compulsory levies' evolution.

Table 2: estimation of the link between the spontaneous growth rate of CLs and the growth rate of GDP

	(1)	(2)
Explanatory variables		
GDP growth rate	1.01*** (14.64)	1.07*** (24. 68)
Constant	0.03 (1.21)	
Regression standard error	0.88%	0.89%
R^2	0.88	
Specification tests (p-values)		
Autocorrelation of residuals	0.83	0.85
Heteroscedasticity	0.80	0.92
Normality	0.30	0.24
Stability test (break in 2006)	0.97	0.97
Stability test (break in 2019)	0.73	0.49

Reading:

- *the values in brackets indicate Student's statistics;*
- *the R^2 indicates the proportion of the variance of the explained variable, in this case the spontaneous growth rate of compulsory levies, which is explained by the explanatory variables, in this case the GDP growth rate. It is only defined when the estimated equation includes a constant.*
- *The specification tests[7] check that the residuals of the regression are not correlated with each other (Lagrange multiplier test with 4 lags), are not heteroscedastic (regression test of the squares of the residuals on those of the explanatory variables), have moments of order 3 and 4 of a centred normal distribution with a variance equal to that of the residuals (Doornik and Hansen normality test) and that the coefficients are stable (Chow tests at half the period - here in 2006 - and at 90% of the period - here in 2019);*
- *the p-value given in the table is the threshold at which we start to reject the hypothesis that the tests are negative; *** indicates a significant value at the 1% threshold (which therefore has less than a 1% chance of being zero). Given the number of tests carried out (5), these tests will be considered as rejected if one of them has a p-value of less than 1%, which implies an error in the choice of the relationship form between the variables or the omission of an important explanatory variable.*

[6] The explanatory capacity of the model is not affected, as the constant can be considered as zero and the estimate of the impact of CLs growth on GDP growth is more accurate.

[7] These tests are identical to those proposed by D. Hendry for his pc-gets software (see for example D.F. Hendry and H-M Krolzig (2000): "Computer Automation of General-to-Specific Model Selection Procedures", Journal of Economic Dynamics and Control, 25 (6-7), pp. 831-866).

3.2 The gap between spontaneous CLs growth and GDP growth should be the preferred indicator compared to the elasticity of CLs to GDP.

A high elasticity is often considered as a sign of an abnormal evolution of compulsory levies. This analysis implicitly assumes that the hazards affecting the relationship between CLs growth and GDP growth are proportional to the latter. For example, an elasticity of 1.5 is then considered high, whether GDP growth is 1% or 10%: in the first case, this implies a 0.5 points difference in the CLs growth rate, whereas this difference amounts to 5 points in the case of a 10% GDP growth.

An opposite hypothesis, at the basis of the regression presented in table 2, leads on the contrary to consider that the hazards on CL growth are independent of GDP growth[8].

The elasticity behaviour around zero GDP growth in value terms is an argument in favour of this hypothesis: for the elasticity not to take on very large values, the spontaneous growth of CLs would itself have to become very close to that of GDP, and therefore very low. This is hardly plausible, particularly because low GDP growth does not prevent some taxable bases from growing, others from shrinking, and there is no reason why the impact on CLs of these contrasting developments should compensate exactly. An econometric test *(see box below)* carried out over the period 1991-2021 provides a second justification for this hypothesis: although GDP growth was never less than 1% over the period, the test leads to a clear rejection of the hypothesis according to which the CLs growth rate is proportional to the GDP growth rate, in favour of the alternative hypothesis that the two growth rates are independent.

Box: tests of the relationship form between spontaneous compulsory levies growth and the GDP growth rate

The fact that the specification tests are passed, and at fairly high thresholds, suggests that the chosen functional form is correct. It assumes that CLs are affected by fluctuations following a normal distribution around GDP growth multiplied by 1.07 and not that the elasticity itself fluctuates.

It is possible to go further and formally test this model against the model which is used implicitly when comparing the elasticity to its historical average.

Formally, this last model is written as:

(A) $\frac{\dot{CLs}}{\dot{GDP}} = \sigma + u_t$

where u_t is assumed to follow a normal distribution with a variance of σ_u^2, $\dot{CL}$ and $\dot{GDP}$ are the growth rates of spontaneous tax levies and GDP, respectively.

If this functional form is the correct one, then we deduce:

(B) $\dot{CLs} = \sigma\dot{GDP} + u_t\dot{GDP} = \sigma\dot{GDP} + v_t$

where the residual v_t has a variance of ${\sigma_u}^2\ GDP^2$

[8] More precisely, uncorrelated. Insofar as the tests lead to accept the hypothesis of normality of the residuals, the abuse of language consisting in speaking of independence is thus acceptable.

Equation (2) in Table 2, given the very simple form of the model here, should thus exhibit heteroscedasticity in exactly the form tested by the specification test used for the estimates in Table 2. However, this test does not lead to the conclusion that the residuals are heteroscedastic.

Conversely, if the functional form of equation (2) in Table 2 is the correct one, then the model is written:

(C) $C\dot{L}s = \sigma G\dot{D}P + w_t$

where w_t is supposed to follow a normal distribution with a variance of $\sigma_w{}^2$.

This implies:

(D) $\frac{C\dot{L}s}{G\dot{D}P} = \sigma + \frac{w_t}{G\dot{D}P_t} = \sigma + z_t$

The residual z_t has then for variance $\frac{\sigma_u{}^2}{G\dot{D}P^2}$

The estimation of the equation should therefore show heteroscedasticity, which can be tested with the following regression:

(E) $z_t^2 = a + \frac{1}{G\dot{D}P^2}b + \epsilon_t$

This estimation provides the following results for the coefficients with their Student statistic in parentheses:

a = 0,0088	*b = 0,000058*
(0.33)	*(5.58)*

They reveal highly significant heteroscedasticity, with the expected shape under the assumption of equation (C) validity. Therefore, this test confirms that it is necessary to reason on the difference between the spontaneous growth rate of CLs and that of GDP (multiplied by 1.07, such as the coefficient estimated by equation (2) in Table 2).

3.3 Wages growth helps explain the "spontaneous" growth of compulsory levies

In 2020 and 2021, the spontaneous growth of CLs significantly exceeded that of GDP and this should again be the case in 2022. The good performance of the wage bill and consumption in value terms relative to that of GDP (notably due to the fact that consumer prices are much more dynamic than those of GDP), have been put forward to explain these differences. These elements invite us to try to complete the equation used so far with data on the wage bill and household consumption.

To that end, the growth rate of the share of private sector wages in GDP (gross wages[9] paid by businesses, financial and non-financial, and non-profit institutions serving households) and the growth rate of the consumption value in GDP were added to the GDP growth rate and the constant (equation 3 in Table 3). The choice was made to add the growth rates of the wage or consumption share in GDP rather than their absolute growth rates in order to allow the coefficient attached to GDP growth to be interpreted directly as the average elasticity of CLs to

[9] "D11" in national accounting.

GDP and to make it comparable to the coefficient in equations (1) and (2) of table 2. Both options are in any case equivalent "to the first order" (see Annex 2 for results obtained by directly adding the growth rate of wages and consumption to that of GDP).

This regression shows that the growth in the share of private sector wages in GDP provides a significant additional explanation for the spontaneous growth of CLs, even though the year 2022 is not included in the estimation period. Tests were also carried out with gross wages received by households, with close results but with a slight loss of precision in the estimation, and tests with the growth rate of the ratio of the GDP price to the household consumption deflator or to the consumer price index, with results that were still insignificant.

Consequently, a better relationship can be obtained by removing the growth rate of consumption and the constant from the regression (equation 4 in Table 3). Thus, it can be seen that the GDP growth rate still partly explains the CLs growth rate, but that the wage bill, which is the main base of several CLs (social security contributions, CGS, CRDS, income tax in particular) also does.

Table 3: considering additional variables to explain the spontaneous growth rate of CLs

	(3)	(4)
Explanatory variables		
GDP growth rate	1.00*** (16.56)	1.05*** (28.46)
Growth rate of the private sector wage share in GDP	0.65*** (3.56)	0.60*** (3.68)
Growth rate of consumption share in GDP	-0.22 (-0.99)	
Constant	0.0016 (0.72)	
Regression standard deviation	0.75%	0.74%
R^2	0.92	
Specification tests (p-values)		
Residuals autocorrelation	0.41	0.55
Heteroscedasticity	0.96	0.54
Normality	0.65	0.20
Stability test (break in 2006)	0.81	0.88
Stability test (break in 2019)	0.47	0.26

3.4 The spontaneous CLs rate is at most slightly cyclical

It is often argued that the spontaneous CLs rate is cyclical, i.e that it is boosted in the high phase of the cycle and reduced in the low phase, notably because of progressive taxes.

To test this hypothesis, three approaches were tested:

- in a first approach, a measure of the position of the economy in the cycle was introduced into the regression; the measure chosen is the European Commission's output gap[10];

[10] FRA_1_0_0_0_AVGDGP series from the European Commission's Ameco database of November 2022.

- in a second approach, the growth rate of real GDP was introduced above a value determined by grid search, i.e. the regression was tested with values varying between 0 and 2% and the one that gave the best fit was kept;

- in a third approach, the growth rate of GDP in value terms, beyond a value determined by running through the values between 0 and 2% was introduced.

The first approach reflects the idea of GDP cyclicality, but has the disadvantage of using unobservable data, which are also subject to revisions that considerably weaken their contribution to the assessment of real time CLs' evolution.

The second approach greatly reduces this disadvantage: only revisions of the national accounts matter (which, however, also weakens the assessment when growth is close to the threshold thus estimated). It has the disadvantage of giving the same importance to a strong increase in GDP at the end of a recession as to one after a phase of sustained growth.

Finally, the third approach is similar to the previous one but assumes that it is the increase in value GDP that determines the ability of agents to pay their taxes and not the state of the overall economy.

The results of these regressions (see Table 4) lead to the conclusion that neither the output gap nor the value of GDP growth in value significantly affects the link between CLs and GDP growth, but that, on the other hand, two regimes of GDP growth in volume can be distinguished: when growth is low, less than or equal to 1.6%, the spontaneous CLs increase reacts less to a GDP increase (elasticity of 0.92) than when it is higher (elasticity of 1.1). However, this effect is borderline to be rejected at a 5% significance level and could even be rejected if we consider the correction that would have to be introduced because the 1.6% value is itself affected by uncertainty.

It should be noted that, as with any econometric result, this is an "average" result and that there are years (e.g. 2020) when real GDP growth is below the estimated threshold of 1.6%. But when the application of an elasticity of 1.05 and the correction by the wage share in GDP are more in line with the observed spontaneous CLs than those obtained with an elasticity of 0.92.

Table 4: Taking the cycle into account in explaining the spontaneous growth rate of CLs

	(5)	(6)	(7)
Explanatory variable			
GDP growth	1.06*** (28.10)	0.92*** (13.81)	0.89*** (8.20)
Growth in the share of private sector wages in GDP	0.57*** (3.32)	0.56*** (3.60)	0.56*** (3.46)
GDP growth multiplied by the output gap	0.014 (0.81)		
GDP growth when real GDP growth exceed 1.7%		0.18** (2.29)	
GDP growth when GDP growth in value exceed 1.7%			0.18* (1.57)
Regression standard deviation	0.75 %	0.70 %	0.73 %
Specification tests (p-values)			
Residuals autocorrelation	0.60	0.06	0.31
Heteroscedasticity	0.98	0.98	0.89
Normality	0.51	0.07	0.86
Stability test (break in 2006)	0.85	0.97	0.79
Stability test (break in 2019)	0.27	0.70	0.63

3.5 Re-reading of the spontaneous evolution 2020 and 2021 as well as the forecast for 2022 in the Budget bill 2023

The results of the previous sections are used here to review the evolution of spontaneous CLs growth over the last two years, 2020 and 2021, as well as the Government's 2022 forecast associated with the 2023 Finance Bill.

The calculation of the elasticity of CLs to GDP (line 3 of Table 5) thus reveals values close to 1 in 2020 and 2021, but very different from 1 in 2022, which, without caution, could indicate an abnormal growth of CLs in the government's forecast for 2022.

Calculating the weighted difference between the two growth rates confirms that it is insignificant in 2020 and 2021, but that it is significant (i.e. greater than twice the standard deviation of the regression which is 0.75%) in 2022: its value of 2.33% is greater than 1.5%, which could suggest an over-optimistic forecast by the Government.

However, considering the particularly high dynamism of the wage bill expected in 2022 (+8.6% for the non-agricultural market branches in the budget bill, against a GDP growth forecast of 5.6%) calls this conclusion into question: if the latter is considered, the CLs excess is significantly reduced, to only 0.72%, and should therefore be considered insignificant, provided that the macroeconomic forecast itself does not overestimate GDP growth. The gap, at 1.37%, becomes almost significant in 2020.

Nevertheless, it should be noted that the fall in the wage bill in 2020 has as a significant counterpart very high expenditure related to partial activity, which, while not giving rise to social security contributions, has been subject to deduction of income tax and that the corresponding revenue cannot be captured either by GDP or, by construction, by the wage bill. Let us recall once again that the private sector wage bill approximates the real base of social charges.

Finally, taking the economic situation into account only marginally modifies the previous diagnosis but makes the differences between the spontaneous CLs and their explanatory factors smaller and therefore less significant.

This exercise illustrates the risks of an analysis based solely on the link between the spontaneous growth rate of the CLs and GDP growth. Thus, the 2022 exercise highlights that a difference between the spontaneous growth rate of CLs and GDP may be due to the evolution of another important determinant of the tax base, namely in this case the wage bill.

While it is clearly preferable to the sole relationship between the growth rate of CLs and GDP growth, the one that also involves the evolution of the wage bill remains surrounded by significant uncertainty: the 95% confidence interval, which is the standard statistical measure of the acceptable range of a forecast, shows a range of 1.5%, or almost 0.7 GDP points of public deficit!

Moreover, many taxes have bases that are only moderately correlated with GDP and we cannot be sure that divergent trends between these bases, GDP and the wage bill, may not occur in the future, which would cause the CLs growth to deviate from the expected trend solely based on growth in GDP and the wage bill. Thus, the only robust method consists in analysing the spontaneous evolution of the main CLs according to their own tax base.

Table 5: Re-review of the CLs spontaneous growth rate CLs in 2020, 2021 and 2022 (Budget bill forecast for 2023)

	2020	2021	2022 (2023 Budget bill)
CLs spontaneous growth rate (1)	-4,.36 %	9.45 %	8.36 %
GDP growth rate (2)	-5.22 %	8.24 %	5.64 %
Elasticity = (1) / (2)	0.84	1.15	1.48
Weighted difference between these two growth rates[11] = (1) - 1,07 x (2)	1.23 %	0.63 %	2.33 %
Growth rate of the wall bill share in GDP (3)	-0.42 %	0.34 %	2.86 %[12]
Difference after taking account of the wage bill[13] = (1) – 1,05 x (2) – 0,6 x (3)	**1.37 %**	**0.60 %**	**0.72 %**
Real GDP growth rate (4)	-7.8 %	+6.7 %	+2.7 %
Difference after taking account of the wage bill and the economic cycle[14] = (1) – 0,92 x (2) – 0,56 x (3) – (0,18 x (2)) (si (4) > 1,6 %)	**0.67 %**	**0.11 %**	**0.52 %**

[11] Equation (2) in table 2.
[12] Calculated on the assumption that the growth of the private sector wage bill is equal to that of the non-agricultural market sectors, which is in fact a good approximation.
[13] Equation (4) in table 3.
[14] Equation (6) in table 4.

Annex 1: Construction of the spontaneous growth series of compulsory levies

The CLs data is taken from the Insee table T_3216.xlsx published in May 2022 and available at : https://www.insee.fr/fr/statistiques/6438777?sommaire=6438793. The new measures are those retained by the Government to which has been added the indexation of the income tax scale, which the Government does not consider as a new measure even though it requires an article of the Finance Act and is therefore a measure of the Budget bill. Considering it as a new measure also makes it possible to isolate the pure impact on the tax scale of the income increase from the measures taken to correct its progressiveness, partially and in a different way each year[15]. Thus, not taking into account the revaluation of the scale as a new measure amounts to considering that, for a given nominal income, the revaluation of the scale has no effect on the income tax yield, even though it aims to limit the effects of the progressiveness of the scale on its yield: for a given increase in income, a 10% revaluation of the scale will lead to a decrease in the progressivity of the scale and therefore the tax yield, whereas no revaluation of the scale will further emphasise this progressivity and lead to a higher yield.

The new measures excluding the scales are taken from:

- For the years 1990 to 2000, data in GDP points collected by François Écalle[16], transformed into € using the GDP series of the INSEE accounts of 2011, slightly lower than today's[17];
- For the years 2001 to 2007, data on the difference between actual CLs and spontaneous CLs from the Economic, Social and Financial Report multiplied by the amount of CLs for the previous year
- For the years 2007 onwards, the amounts of new measures included in the reports on compulsory levies (up to 2011) and in the economic, social and financial reports relating to the Budget bills of year N+2 (from 2012 onwards);

The amount of the scale indexation is derived from:

- For the years 1990 to 2010, data from the working paper by Q. Lafféter - M. Pak (2015): "Élasticités des recettes fiscales au cycle économique : étude de trois impôts sur la période 1979-2013 en France ", Insee, Direction des études et synthèses économiques, working paper n° G2015/08 ;
- For the years 2011 to 2017, Volume 1 of the "Voies et moyens[18]" report annexed to the corresponding Finance Bill;
- For the years 2018 and after, the "Prior evaluations" appended to the corresponding Finance Bill.

[15] Thus, the Government has chosen not to revalue the scale in 2012 and 2013;
[16] www.fipeco.fr/
[17] Notably because of the inclusion of investment in R&D and military equipment in GDP.
[18] This is a document associated with the draft finances bill, which explains the results and forecast of State revenues.

	Recorded compulsory levies (B€)	discretionary levies measures except for income tax brackets indexation (B€)	income tax brackets indexation (B€)	Spontaneous growth rate of compulsory levies (in %)
1990	430.667	-1.1	-1.255	
1991	449.749	2.2	-1.256	4.22
1992	459.961	3.4	-1.34	1.81
1993	471.77	4.6	-1.285	1.85
1994	493.963	13.0	-3.7	2.74
1995	513.207	2.4	-0.659	3.54
1996	541.474	8.8	-0.88	3.97
1997	561.704	2.6	-0.995	3.44
1998	585.638	2.7	-0.523	3.87
1999	616.837	-4.2	-0.38	6.11
2000	638.984	-14.8	-0.281	6.03
2001	659.551	-16.1	-0.808	5.86
2002	669.549	-7.2	-0.977	2.76
2003	684.782	2.2	-1.074	2.11
2004	718.269	2.7	-1	4.64
2005	752.856	6.5	-1.083	4.06
2006	794.776	0.6	-1.2	5.65
2007	820.763	-12.1	-1.14	4.94
2008	837.98	-9.8	-0.856	3.40
2009	798.669	-19.6	-1.917	-2.12
2010	827.226	4.1	-0.261	3.09
2011	879.856	21.4	-1	3.90
2012	916.345	22.8	0	1.56
2013	950.499	29.5	0	0.51
2014	962.204	3.3	-0.9	0.98
2015	978.355	-1.6	-0.55	1.90
2016	995.311	-3.4	-0.06	2.09
2017	1036.769	3.1	-0.06	3.86
2018	1057.483	-8.7	-1.1	2.94
2019	1068.55	-24.1	-1.76	3.49
2020	1025.965	5.1	-1.1	-4.36
2021	1107.689	-15	-0.23	9.45

Annex 2: direct inclusion of additional variables in the explanation of the CLs spontaneous growth rate

Explanatory variables	(8)	(9)
GDP growth rate	0.58*** (2.58)	0.45*** (2.65)
Growth rate of the private sector wages	0.65*** (3.62)	0.60*** (3.74)
Consumption growth rate	-0.22 (-0.98)	
Constant	0.0016 (0.72)	
Regression standard deviation	0.75 %	0.74 %
R^2	0.92	
Specification tests (p-values)		
Residuals autocorrelation	0.42	0.57
Heteroscedasticity	0.58	0.99
Normality	0.66	0.54
Stability test (break in 2006)	0.61	0.85
Stability test (break in 2019)	0.82	0.27