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Forecasting of tax expenditures
Withholding tax on interests and dividends

This note is part of a series of technical notes that detail the forecasting of tax expenditures. The Inventory of tax expenditures is ex-post and the most recent data have a lag of 2 or 3 years compared to the calendar year to which the Budget refers. For example, the Inventory that will be annexed to the 2021 Ways and Means Budget includes estimates of the revenue forgone for 2018 for PIT and CIT and for 2019 for indirect taxes and withholding taxes. The forecasting exercise intends to fill the gap and to reconcile the Inventory of Tax Expenditures with the ex-ante nature of the budget.

A first note has already been finalised on PIT Tax expenditures (1) This one relates to the tax expenditures relating to the withholding tax on interests and dividends (Précompte mobilier / Roerende voorheffing). The withholding tax is final for households but is a prepayment of CIT for corporations. This means that any exemption or reduced rate that should apply to financial income accruing to corporations does not constitute a tax expenditures. It just change the composition of their CIT liability, as finally CIT applies to the income received. We only consider the part of the withholding tax that is a final tax.

The first section of this note gives some indication of the main tax expenditures that have to be considered here. In opposite to PIT, they are just a few and one of them – the tax exemption for savings accounts - constitutes the overwhelming part of the revenue forgone. Section 2 describes the results. The estimation methods are the same that those which have been used for PIT. A linear model is preferred when possible, otherwise we use Exponential Smoothing (ES) or Arima. .The

1 Note ESS-SE/2020-0897-03, 29th October 2020, *Forecasting of Federal tax Expenditures - PIT*

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basics of these methods have been explained in the PIT note and the description is replicated in Annex 1.

1 Tax expenditures to be considered

There are only three tax expenditures that have to be considered: the tax exemption for savings account, the one that relates to pension funds and the just introduced (in 2018) PIT (and withholding tax) exemption for dividends.

- The tax exemption is granted up to a fixed amount of interest that is indexed on a yearly basis. The obvious consequence is that when the interest rate decreases over time, the capital amount that benefit from the tax exemption increases accordingly. The ceiling has been halved in 2018 and now amounts to 990€ per person.
- Pension funds can benefit from a waiver of the withholding tax or a reduced rate on the financial income they received.
- The exemption for dividends has been introduced in 2018, together with the halving of the ceiling for the tax exemption for interests of savings accounts. Dividends are tax exempts up to 690 €.

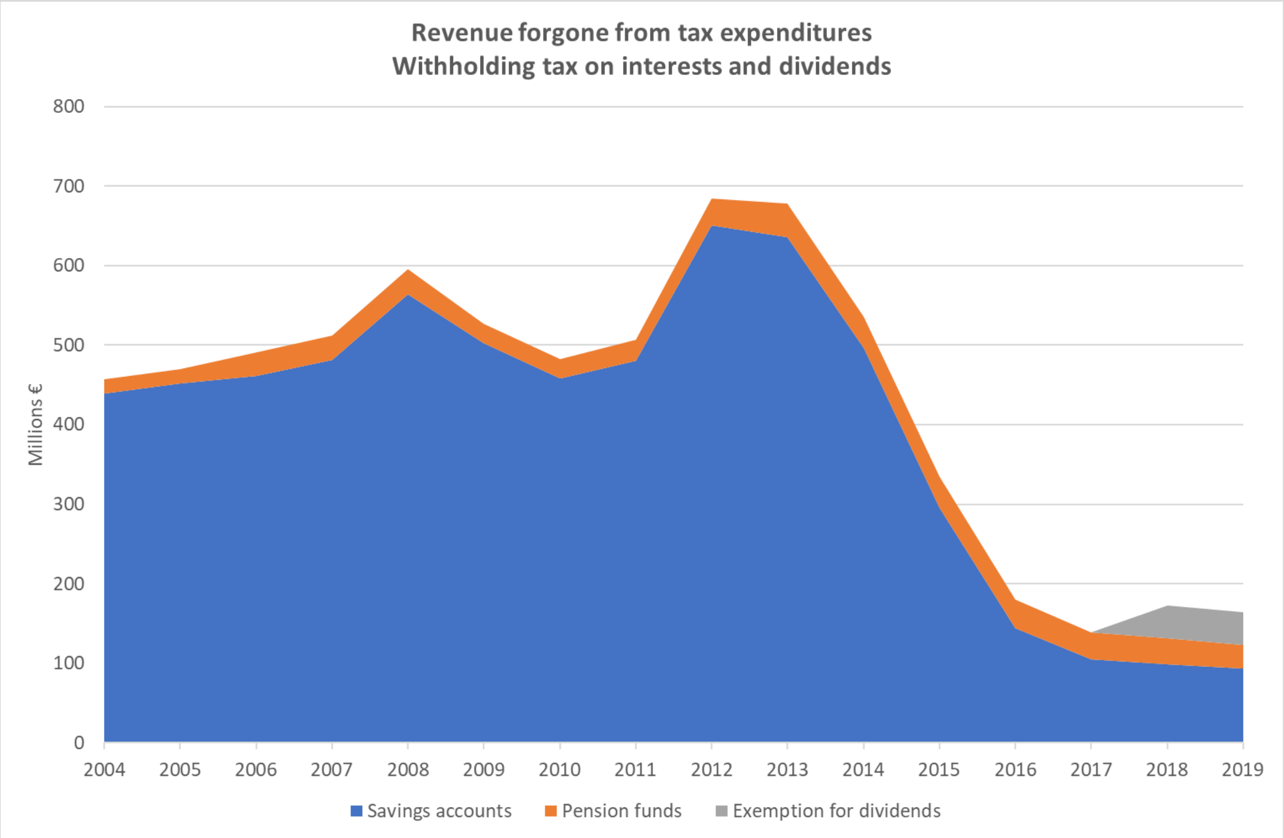
Table 1 displays the revenue forgone in absolute amounts and as a percentage of the corresponding tax revenue. The tax exemption for savings accounts clearly forms the bulk of the revenue forgone and has been decreasing quite strongly over time, due to downward trend in interest rates. The downward trend is more visible in Graph 1 that goes back to 2004.

It may be surprising that the downward trend also holds in relative terms, when the revenue forgone is expressed as a percentage of the tax revenue. The WT applies to interests and dividends and dividend income does not exhibit the same downward trend as interest income.

Table 1
Revenue forgone – Withholding tax on interests and dividends.

	2015	2016	2017	2018	2019
Pension funds	295,4	144,6	104,7	99,0	92,9
Savings accounts	39,2	35,7	34,4	32,0	30,2
Exemption for dividends				41,9	41,5(p)
Total	334,6	180,3	139,1	172,9	164,6
% revenue forgone	8,2%	4,5%	3,7%	4,7%	4,4%

Graph 1



2 *The tax exemption for savings account*

Our assumption is that the ceiling is not binding and that the halving had no effect, as interest rates have been cut by more than one half over recent years.

The estimation of the revenue forgone so relies on the whole amount of interest from savings accounts of households. Data on amounts invested and savings accounts and on the interest rate are provided by the Central bank on a quarterly basis. This means that part of the gap between the most recent ex-post year (2019) and the end of the forecasting period (2021) may be filled by ex-post data. We now have data up to 2020Q2.

The explanatory variables should be the disposable income of households, their savings ratio, the interest rate and the rate of the withholding tax (WT). The portfolio choice could also been taken into account. From a "return" point of view, this could be capture by the difference of interest rate on savings accounts and long term interest rates. We also need to account for the precautionary nature of savings account, what could be captured by the unemployment rate. Inflation could also play a motive for precautionary saving.

We just report the final set of results. Neither the disposable income of households nor their savings ratio have proved to be significant. We finally select the interest rate, the withholding tax changes, the ratio of interest rates (savings accounts to long term) and the unemployment rate.

Table 2
Linear model – savings account

Variables	SA1	**SA2**
Interest rate	0.928 (0.043) ***	0.929 (0.043) ***
Change WT rate	0.204 (0.030) ***	0.208 (0.029) ***
SPR	0.002 (0.003) NS	
Unemployment	0.477 (0.126) ***	0.444 (0.113) ***
R^2	0.971	0.971
Adjusted R^2	0.964	0.965

Table 2 presents the results of linear models. The observation period is 1999-2020. All variable are expressed in growth rate., apart from rate of the withholding tax which is expressed as a difference from year to year. This means the corresponding coefficient is a semi elasticity.

Interest rate and the WT rate have the expected sign and highly significant in any of the specifications. The unemployment rate captures precautionary savings with the right sign and is also highly significant. The spread variable is not significant and including it do not improve the R^2. So we opt for SA2;

Table 3 gives the forecasting for 2020-2021. The downward trend still holds and revenue forgone should decrease from 96 million € in 2019 to 80 million € in 2021. As any forecasting, they are highly affected by the uncertainty surrounding the length and the effects of the Covid crisis.

Table 3
Exemption of savings accounts – forecasting 2020-2021

	2019 (Obs)	**2020**	**2021**
Growth rate		3.9%	10,1%
Revenue forgone	95,92	99,67	109,79

Million €

3 Pension funds

The revenue forgone related to the reduced taxation on the amounts of financial income derived from pension saving has remained relatively limited and stable over the last decades (2). For this reason and due to a lack of explanatory variables to fit a reliable linear model, we estimate growth rates based on exponential smoothing. This methodology should capture the basic trend and was explained in the annex.

Table 4
Tax expenditure- pension funds – forecasting for 2020-2021

	2019 (obs)	2020	2021
Growth rate		0,08%	0,08%
Revenue forgone	30,17	30,19	30,22

Million €

4 Tax exemption for dividends

The tax exemption is not given through a relieve of the withholding tax, but through the income tax assessment process: taxpayers that claim for the exemption have to provide the relevant data when filing their tax return. This means that the latest data relates to 2018.

As we just have one observation, it is not possible at this stage to use any of the 3 methods. We simply apply the growth of dividend income accruing to households, available in the short term economic outlook from the Federal Plan Bureau.

Table 5
Exemption for dividends – forecasting for 2019-2021

	2018 (obs)	2019	2020	2021
Growth rate		-1,0%	-6,4%	7,1%
Revenue forgone	41,90	41,49	38,85	41,60

Million €

2 There was no estimate of the revenue forgone for 2007.

Annex
Forecasting methods

This annex describes three forecasting methods that might be used: Exponential smoothing, ARIMA, Linear regression.

The first two are variants of trend analysis. The past observations are the explanatory variables, or in other words, the successive data values are related to themselves. These simple methods can be useful in two ways. First , in absence of sufficient and/or good data on explanatory variables to formulate different models, it serves as a second best alternative. We have to keep in mind that data on explanatory variables have to be available not only for the past but for some future years.

Secondly, the baseline predictions can be used to compare with more sophisticated models. Only in the third method we formulate our own hypothetical model using additional independent variables. Eventually, all these methods share the objective to draw a best fitting line by weighing the (external influence on) observations and extrapolating it into the near future.

Exponential smoothing

Exponential smoothing is a simple technique for smoothing time series data. Formerly attributed to Holt (1957), Winters (1960) & Brown (1963), this general method involves assigning exponentially decreasing weights to past observations to provide an estimate of future observations. In contrast, the naïve method places all the weight on the most recent observation and the average method uses a simple average of all observations.

Where S_0 is the first observation:

[1] $S_0 = x_0$

[2] $S_t = \alpha x_t + (1 - \alpha)_{s_{t-1}}, t > 0$

Where α is the smoothing factor, and 0 < α < 1.

The model is estimated using the Box-Jenkins approach. Optimizing α involves applying a method of least squares to minimize the sum squared errors (SSE).

Arima

ARIMA (autoregressive integrated moving average) is a generalized form of an ARMA model. “AR” indicates that the dependent variable is regressed on its own past observations. “MA” indicates that the regression error is a linear combination of error terms whose values occurred contemporaneously and at various times in the past. “I” indicates that the data values have been replaced with the difference between their values and the previous values (process of differencing). Parameters *p*, *d* and *q* denote order (number of time lags), degree of differencing, and the order of the moving-average model respectively. For example: ARIMA (1,0,0) is AR(1), ARIMA(0,1,0) is I(1), or simply a random walk, and ARIMA(0,0,1) is MA(1), or moving average. ARIMA(0,1,1) without a constant is a basic exponential smoothing model, while ARIMA(0,2,2) is equivalent to double exponential smoothing.

The model is again estimated using the Box-Jenkins approach. Coded statistical software using a stepwise process of model identification, estimation and diagnostics ensures an optimized model. Stationarity, seasonality and the (partial) autocorrelation need to be checked to indicate the appropriate model. The estimation involves a method of (non-linear) least squares. The diagnostics checks how strong the assumption holds that the residuals are in fact white noise. The eventual resulting model is the best plausible attempt this approach can have.

Linear regression

The linear regression method allows for the use of explanatory variables and so allows for slightly more flexibility. Independent variables in the model can either refer to macro-economic data (e.g. income, employment, inflation,..) as well capture other external influences (e.g. policy changes). The same process of optimization occurs by minimizing the SSE.

As example, assume that expenditure on childcare (EXP) is related to the number of eligible children (KIDS), female employment (EMPL fem) and household income (INC). These data values are transformed into annual growth rates and inputted into the model. A stepwise process reveals that applying a one period lag (t-1) for female employment leads to a better fitted model.

[3] $$EXP \sim b1KIDS + b2EMPL_{fem\,(t-1)} + b3INC$$

Once the best possible model is found new data values of the independent variables, either already available or predicted, are introduced. Within certain confidence intervals, the result is the estimated growth rate of expenditure on childcare, considering the influence of the growth rates of eligible children, female employment the year before, and household income, in the next period(s).

However, there are numerous potential pitfalls. First of all, the relationship assumed in the model needs to make economic (theoretical) sense. In the example above, the number of eligible children is a good proxy because it also captures policy changes. For example, the extensions of the eligible children from 0-3 year to 0-12 years is captured by the variable. Using the population birth rate instead would make less sense.

Secondly, one should avoid over-fitting the model in return for a small increase in explaining power (Ockham's razor). Additional variables like the inflation rate can be included in the model above but can also complicate things more than they contribute in a significant way. Thirdly, (multi)collinearity should be avoided as much as possible as this would likely inflate the error terms and lead to unreliable estimates. Taking these points into consideration, the linear model is ultimately preferable to the smoothing or ARIMA method if additional reliable data is available and valid hypothesis can be made about their relationship.