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From:	Commission services
To:	Working Party on Tax Questions (Direct Taxation – CCTB)
Subject:	CORTAX model

Delegations will find attached a working paper from the Commission in view of the meeting of the WPTQ - Direct Taxation (CCTB) on 1 February 2018.

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
TAXATION AND CUSTOMS UNION
Direct taxation, Tax Coordination, Economic Analysis and Evaluation
Economic analysis, evaluation & impact assessment support

Brussels, 26 January 2018
TAXUD/D4/GN

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1. Introduction

This paper is structured as follows. Section 2 includes a brief description of the CORTAX model used for the Impact Assessment of the CCTB. It also describes the current work on recalibration of the model with 2016 data (comp. 2012 for the previous version). Section 3 highlights which articles of the proposal for a Council Directive on a Common Corporate Tax Base need to be stabilized in the compromise text for further analysis in CORTAX and by the Member States. Section 4 indicates the depreciation rates used in the CORTAX model. Section 5 presents questions for discussion.

2. CORTAX

2.1 Brief Description of the CORTAX Model

The CORTAX model is a computable general equilibrium model (CGEM) designed to evaluate the effects of corporate tax reforms in 28 EU countries capturing the optimal behaviour of all agents in the economy. The CGEM models the consumption, savings, production and public finances of Member States with data that are country-specific. Countries are linked to each other via international trade in goods markets, international goods markets and investment by multinationals. The model also includes Japan, USA and a theoretical tax haven (with a 5% CIT rate).

Firms are divided into three categories: multinationals headquarters, their subsidiaries located abroad and domestic firms that only produce in their country of residence. In Each member State, there is a representative domestic company and a representative multinational company that has a subsidiary in each Member State. This allows mimicking the intra-group trade. Multinationals and domestic firms differ to the extent that the former optimise profits globally and are engaged in profit shifting activities across borders. Domestic firms pay their corporate taxes in their country of residence according to the revenues generated in this country only. Both domestic and multinational firms shift profits to tax haven to reduce their tax burden. Whilst on aggregate taxable profits are positive, the model includes random shocks affecting revenues that can be attributed to, for example, business cycle evolutions. These shocks may result in losses that can be carried forward in the model.

In relation to government, there is a balanced budget where consumption and public debt are a fixed proportion of GDP. Tax revenues and/or transfer payments adjust to keep a constant public budget. The taxes included in CORTAX are taxes of consumption and direct taxes on income from corporate and labour, as well as taxes on dividends, capital gains and interest. Government consumption and government debt as a share of GDP are maintained constant after a reform.

The effects of reforms can be expressed as changes in GDP, household consumption, business investment and fiscal revenue. The model is elaborated using data from different data sources including Eurostat, the OECD, the United Nations, the IMF and the Orbis firm database (see Section 4.2 below for more details). In the present exercise, the model has been constructed with a database for the year 2012 (which was the latest available year for all variables of the model). The structural description of the model and the calibration process borrow heavily from Bettendorf et al.[1]

2.2 *Calibration of CORTAX Model*

The model is currently being re-calibrated with 2016 data using different data sources. For the sake of continuity, generally the same data sources as in the original calibration undertaken by the CPB were used, see Bettendorf and van der Horst (2006). The 2012 data was used as the reference year for the calibration, as it represented a good compromise between timeliness and completeness. Following the initial calibration (Bettendorf and van der Horst, 2006)[2] the countries covered include the EU's 28 member states, the United States and Japan. An initial attempt has been made to collect information on an expanded set of countries, including many non-EU OECD members and China, but due to unequal coverage in the original data sources this possibility will have to be more fully explored in subsequent expansions of CORTAX. In a small number of cases alternative data sources or reference year were used or missing values imputed.

The following is a list of parameters used in the CORTAX model. In bold, we highlight the tax-related parameters.

1. Parameters/data directly entering the corporate tax base:
    a. CIT compliance costs
    b. Share of bond/equity financing
    c. Rate of return on bonds & equity
    d. Deductible fraction of interest / equity payments
    e. Growth rates of output & population
    f. "True" depreciation rate of capital
    g. Depreciation schedule for
        i. Buildings
        ii. Machinery
        iii. Intangibles
        iv. Inventory valuation (LIFO, FIFO, average)
    h. Capital stock
    i. Probability of profit/loss (and hence, loss carried forward)

2. Other key parameters/data:
    a. FDI stock positions (for subsidiary sizes)
    b. Employment data: labour force and hours worked
    c. Production data: elasticity of substitution labour-capital
    d. Tax rates (corporate, consumption, labour, dividends, capital gains)
    e. Profit shifting elasticities: transfer pricing & tax havens
    f. Rate of time preference
    g. Definition of a subsidiary
    h. Definition of a multinational company
    i. Tax treatment of interest paid and notional interest on equity

[1] Bettendorf, L., van der Horst, A., de Mooij, R., Devereux, M and Loretz, S. (2009), 'The economic effects of EU-reforms in corporate income systems', Study for the European Commission Directorate General for Taxation and Customs Union.
[2] Ibid

Section 3 – Stabilized Articles for Common Base Analysis

Table (1) below gives an overview of the elements of the proposal for a Council Directive on a CCTB that would need to be stable for the purpose of CORTAX.

If Articles 11, *the Allowance for growth and investment ('AGI'),* and 9, *the Deductible Expenses*, are not included in the stabilized articles for the common base proposal, the European Commission will reflect on whether these tax provisions could be included as options for Member States to apply after the computation of a CCCTB.

Section 4 – Depreciation schemes and inventory valuation

In the Commission's Impact Assessment that accompanied the proposals for a Council Directive on a CCTB and a CCCTB[3], for both CCTB and CCCTB the following rates are used in the definition of the common tax base: a 12.5 percent straight line depreciation rate for machinery (8 years), a 4 percent rate for industrial buildings (25 years), a 6.67 percent rate for intangibles (15 years) and an average value for inventories (alternative tax bases are also simulated as part of the sensitivity analysis).

[3] See: https://ec.europa.eu/taxation_customs/sites/taxation/files/swd_2016_341_en.pdf

Table 1. **Articles from COUNCIL Directive and corresponding CORTAX Parameters**

Articles	**Text**	**Corresponding CORTAX Parameter(s)**
2, *Scope*, c	It belongs to a consolidated group for financial accounting purposes with a total consolidated group revenue that exceeded EUR 750 000 000 during the financial year preceding the relevant financial year;	*Type/share of companies applying the common base*
3, *Parent company and qualifying subsidiaries*, a	It has a right to exercise more than 50 % of the voting rights; and	*FDI stock positions*
4, Definitions, notably (5), (6),(12), (13), (19), (22), (23)		*Important changes to definitions might require an adjustment of the modelling.*
7, *Elements of the Tax Base*	The tax base shall be calculated as revenues less exempt revenues, deductible expenses and other deductible items.	*All parameters directly entering the tax base*
8d, *Exempt Revenues*	Received profit distributions, provided that the taxpayer has maintained a minimum holding of 10 % in the capital or 10 % of the voting rights of the distributing company for 12 consecutive months, with the exception of profit distributions from shares held for trading as referred to in Article 21(4) and profit distributions received by life insurance undertakings in accordance with point (c) of Article 28;	*Taxation of dividends from subsidiaries*
10, *Other Deductible Items, entire article*	A deduction shall be made in respect of the depreciation of fixed assets referred to in Articles 30 to 40.	*Depreciation Schedule for the four classes of assets.*
11. Allowance for growth and Investment	Allowance for growth and Investment	*Tax treatment of equity (notional distribution).*
12a, *Non-deductible items*	Profit distributions and repayments of equity or debt;	*Relevant for the computation of the tax base.*
12c, *Non-deductible items*	The transfer of retained earnings to a reserve that	*Relevant for the computation of the tax base.*

Table 1. **Articles from COUNCIL Directive and corresponding CORTAX Parameters**

	forms part of the equity of the company;	
12d, *Non-deductible items*	Corporate tax and similar taxes on profits;	*Relevant for the computation of the tax base.*
33, *Individually depreciable assets*	Without prejudice to paragraph 2 and Articles 37 and 38, fixed assets shall be depreciated individually over their useful lives on a straight-line basis. The useful life of a fixed asset shall be determined as follows: (a) commercial, office and other buildings, as well as any other type of immovable property in use for the business, with the exception of industrial buildings and structures: 40 years; (b) industrial buildings and structures: 25 years; (c) long-life fixed tangible assets, other than the assets referred to in points (a) and (b): 15 years; (d) medium-life fixed tangible assets: 8 years; (e) fixed intangible assets: the period for which the asset enjoys legal protection or for which the right has been granted or, where that period cannot be determined, 15 years.	*Depreciation Schedule, see table in next section*

Section 5 - Questions to Delegations

1. Have you attempted to model the impact of the common base proposal? If yes, what have been the key difficulties? If not, why not? 2. CORTAX does not model the positive fiscal effect of removing all current corporate tax expenditures. What are the largest corporate tax expenditures you have currently in place? Do you have a quantification of their fiscal costs?