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# Non-Tax Revenue in the European Union: A Source of Fiscal Risk?

Gilles Mourre, Adriana Reut

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Gilles Mourre, Adriana Reut

## Abstract

This paper examines the characteristics of government non-tax revenue in the European Union. Non-tax revenue includes a large number of diverse income sources, such as fees charged for the provision of public services, income from financial assets and government property, and EU funds. Receipts from sources other than taxes account for slightly more than one-tenth of total revenue, but the fiscal risk stemming from the volatility of non-tax revenue is three times higher than that from the volatility of tax revenue. We present measurements of volatility in non-tax receipts in the Member States that can help identify the uncertainty around annual projections of revenue. Panel data analysis is used to examine whether macroeconomic and fiscal variables can explain the differences in non-tax revenue among Member States. Government spending, tax receipts and the size of financial assets held by government are found to explain close to a third of the cross-sectional variation in non-tax revenue. Granger causality tests are used to examine the direction of causality across Member States between non-tax revenue, tax receipts, and government spending.

**JEL Classification:** E62, H27.

**Keywords:** non-tax revenue, government revenue, revenue volatility, taxation, Granger causality, panel data analysis, non-tax revenue in the European Union: a source of fiscal risk?

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## EXECUTIVE SUMMARY

Non-tax revenue is defined by exclusion: all government revenue that is not derived from taxes may be classified as falling under this broad category. Despite its relevance for fiscal policy, it is an area that has been scarcely studied for developed economies, especially from a cross-country perspective. This is in part due to the fact that it encompasses a large heterogeneity of revenue sources and its composition typically also reflects country-specific circumstances. This study is a first attempt to provide an overview, using comparable national accounts data, of the significance of this group of revenues for the European Union (EU). The paper assesses the size, composition and volatility of non-tax revenue in the EU, and it explores, by means of econometric analysis, whether macroeconomic and fiscal conditions can explain the observed heterogeneity in non-tax revenue across the Member States.

Although tax revenue is by far the most important source of general government revenue in all of the Member States, government receipts from sources other than taxes are significant. Non-tax revenue in the EU as a whole accounted for around 12% of total revenue in 2014, which is equivalent to slightly more than 5% of GDP. The greater part of non-tax revenue consists of sales of goods and services and from income from government assets. Local governments rely on sales of goods and services for almost 15% of their total revenue, reflecting the greater recourse to user charges at that level of government. Member States that joined the Union in 2004 and 2007 tend to have relatively larger shares of non-tax current receipts, notably from EU funds. Strikingly, no convergence over the past twenty years can be observed in the levels and composition of non-tax revenue across the EU Member States.

The fiscal risk stemming from the volatility of non-tax revenue is significant and proportionally greater than that from the volatility in tax revenue. The relative variability of non-tax revenue is around three times higher than that of tax revenue. As a result, and despite its small size compared with total revenue (around one-tenth), non-tax income accounts for one-third of the volatility of government revenue in the EU. This pattern is shared by a majority of Member States and is undoubtedly a source of risk for public finances, especially in a context of high public indebtedness in many EU Member States. However, in one third of EU Member States, non-tax revenue was found to be inversely correlated to tax revenue between 1995 and 2014. In these countries, tax revenue partly offset the pro-cyclical variation in tax receipts and thereby contributed to stabilising total revenue. The measurements of volatility in non-tax receipts presented in this paper can help identify the uncertainty around annual projections of revenue, which directly affects the budget balance.

Panel data analysis is used to examine whether macroeconomic and fiscal variables can contribute to driving the differences in non-tax revenue among Member States. The results indicate that higher government spending is associated with an increased use of non-tax revenue sources, while lower tax receipts are associated with higher non-tax revenue. Together with the size of financial assets held by the government, these variables can explain close to a third of the cross-sectional variation in non-tax revenue. By contrast, differences in fiscal decentralisation across EU Member States are not found to explain the variation in non-tax revenue. The results show large unobserved country fixed effects, which underlines the importance of country-specific factors and the need for complementary country-specific analysis on the nature and key determinants of non-tax receipts.

Finally, the panel data analysis has illustrated a statistical relationship between variables, which could be highly endogenous with a potentially unclear direction of causality, if any. Granger causality tests are used to examine whether, and in which Member States, unidirectional causality runs from tax receipts and government spending to non-tax revenue. Tax receipts and government spending appear to 'cause' non-tax revenue in five and six Member States respectively. Conversely, non-tax revenue contributes to 'determine' tax receipts in six Member States and government spending in another five. At the same time, in a majority of Member States, no clear short-term causal relationship was found between tax receipts, government spending and non-tax revenue. Overall, the assessment underscores the need to consider the fiscal risk from volatile items, such as non-tax revenue and to examine how such receipts can be used to support an efficient revenue policy, after taking due account of national specificities.

# 1. INTRODUCTION

The different sources of government revenue can be categorised under two main headings: taxation and non-taxation revenue. Tax revenue consists of government receipts that are compulsory and unrequited, which means that they are not paid as direct compensation for a specific good or service provided by the government. All other government income is non-tax revenue. Non-tax revenue can include very diverse income sources, such as dividends distributed by government-owned corporations, fees charged against the provision of public health services, road and bridge tolls, and intakes from rental of government land and buildings. The aggregation of dissimilar income sources presents a key challenge for the empirical analysis of non-tax revenue and the hypothesis that such different revenue streams might share some common features or driving factors is a key working assumption. Some government income can be easily recognisable as not being revenue from taxation. Such easily-recognisable revenue streams include income from international grants, or from rents, dividends and interest on the immovable and movable property owned by the government. The distinction is less clear in the case of fees and charges on services provided by the government. The above definition of taxation implies that payments for goods and services provided by the government can be considered as non-tax revenue only if: (i) the individual can exercise a considerable degree of choice as to whether to incur that non-tax liability; and (ii) in return for payment he receives some definite good or service. The considerable degree of choice is typically reflected in the existence of commercial alternatives provided by the private sector or alternative free public services.

There is relatively little or no specific economic literature and applied work on non-tax revenue in developed economies with diversified economic structures. This is perhaps not surprising, because, as mentioned above, non-tax revenue typically consists of income from a very heterogeneous mix of sources, its contribution to total government revenue is relatively small, and, compared to major sources of taxation, most non-tax revenue items have limited role as a tool for governments to influence macroeconomic conditions. Research on non-tax revenue in developing or resource-rich economies has commonly focused on disaggregated components such as foreign aid or revenue from oil, including on the interaction between such revenues and democratisation and economic development. Various studies focus on the relationship between revenue from natural resources and degree of democracy in the resource rich countries. For example, Morrison (2009) makes the argument that non-tax revenue from foreign aid and oil resources contribute to regime stability in both developed and developing countries.

In developed economies, the role of user charges to support a more efficient use and allocation of government resources arguably provides the most important application of non-tax revenue as a tool for economic policy making.<sup>1</sup> Most of the economic literature on user charges focuses on the price signalling function of fees and charges. Bird (1993) argues that user charges achieve the goal of economic efficiency both by providing information to public sector suppliers as to how much clients are actually willing to pay for particular services and by ensuring that what the public sector supplies is valued at least at marginal cost by citizens.<sup>2</sup> Rational consumers consume at the point where the marginal cost to them is equal to the marginal benefit. If the marginal cost is zero (i.e. public services are financed through general taxation), government-produced goods and services will be over-consumed compared to the demand if the real costs were taken into account by consumers. The OECD (2003) also identifies nine best practice guidelines for implementing user charges: clear legal authority, consultation with users, determine full costs, effective and efficient collection system, improve and monitor organisational performance, treatment of receipts, appropriate pricing strategies,

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<sup>1</sup> See Nontax Revenue, Dec 1968, Tax Foundation Inc., Research Publication No. 18: <http://taxfoundation.org/article/nontax-revenues>.

<sup>2</sup> For a detailed discussion, see Bird, R.M. (2003), User Charges in Local Government Finance, World Bank: <http://www1.worldbank.org/publicsector/decentralization/June2003Seminar/Bird2.pdf>.

recognise equity considerations, and ensure competitive neutrality.<sup>3</sup> While recognising the interesting possibilities of user charging for economic policy making, the case for greater recourse to fees and charges on government-produced commodities is outside the scope of this work.

The objective of this study is to assess the importance of aggregate receipts from non-tax sources for government revenue in the European Union (EU) and to test whether macroeconomic and fiscal variables can partly explain the heterogeneity across countries and time in the size of non-tax revenue in the EU Member States. Section 2 proposes a definition of the non-tax revenue and their components using the categorisation of the national accounting. Section 3 is descriptive and reviews the levels, trends and broad composition of non-tax revenue in the EU Member States. Section 4 examines the contribution of fluctuations in non-tax revenue to the volatility of total government revenue. In section 5, a panel data model is used to analyse to what extent macroeconomic variables can explain the difference in the importance of non-tax revenue in the EU. The direction of causality between non-tax revenue and its possible factors is also tested. The annex sets out specific examples of non-taxation revenue streams classified as ESA resources, shows the decomposition of variance of total revenue over a long period and presents the detailed results of stationarity tests.

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<sup>3</sup> OECD (1998), User charging for Government services: Best Practice Guidelines and Case Studies, 1998, Public Management Occasional Papers No. 22.

## 2. OPENING THE BLACK BOX: THE STATISTICAL DEFINITION OF NON-TAX REVENUE

In the European System of Accounts (ESA)-based presentation of government finance statistics (GFS), total government revenue consists of (i) total taxes; (ii) total social contributions; (iii) total sales of goods and services; (iv) other current revenue, and (v) other capital revenue. In this paper, non-tax revenue is defined as consisting of (a) total sales of goods and services; (b) other current revenue; and (c) other capital revenue. As shown in Table 1 below, these three GFS aggregates of non-tax revenue can be mapped to the more detailed transactions recorded under positive resources in the central framework of the ESA sequence of accounts. The detailed transactions in the ESA sequence of accounts provide a richer source of information for analysis of non-tax revenue compared to the GFS aggregates.

Table 1: Mapping of GFS non-tax revenue aggregates with the ESA sequence of accounts' non-tax resources

ESA resources		ESA GFS revenue
P11 P12 P131	Market output Output for own final use Payments for non-market output	Sales of goods and services
D39 D4 D7	Other subsidies on production (receivable) Property income Other current transfers	Other current revenue
D92 D99	Investment grants (receivable) Other capital transfers	Other capital revenue

Source: European System of Accounts – ESA 2010

As shown in Table 1, total sales of goods and services in the ESA GFS presentation consist of the following non-tax resources in the ESA central framework: 'market output' and 'output for own final use' and 'payments for non-market output'. Other (i.e. non-tax) current revenue (ESA GFS) comprises 'property income', 'other current transfers' and 'subsidies' (resources in the ESA central framework). Other (i.e. non-tax) capital revenue (ESA GFS) sums 'other capital transfers' and 'investment grants' (resources in the ESA central framework).

In turn, Table 2 provides some examples of the type of non-tax revenue streams that are recorded under the headings for ESA non-tax resources. 'Market output and output for own final use' include fees for compulsory licenses and other administrative fees whenever the government exercises its regulatory function. These fees are sales of services, which require payment to be proportional to the cost of producing the service, such as court fees or radio and television licenses when public authorities provide general broadcasting services.<sup>4</sup> Market output also includes incomes from rental of government-owned buildings, road and bridge tolls, fees at government hospital and clinics, and entry

<sup>4</sup> A government fee is a tax if it is not proportionate to the cost incurred by the government to provide that good or service to the public. The Manual of Government Deficit and Debt - Implementation of ESA 2010 (MGDD-ESA 2010) states that the following should be treated as a tax: annual permission to use a motor vehicle irrespective of where and when it is used, a charge on the use of land or buildings when the government does not own them, and charges for the permission to own particular type of assets. The MGDD-ESA 2010 further clarifies that if the issuing of licenses involves little or no work for the government, the payment for licenses should be considered a tax, whereas the payment should be treated as a sale of service if the government uses the issue of the licences to organise a regulatory function, such as checking the competence of applicants.

fees to government museums, parks and cultural and recreational facilities. 'Output for own final use' consists of goods or services produced that are retained by government either for final consumption or for gross fixed capital formation. For example, a government department might employ its own staff to construct specialised capital equipment for security purposes. The finished capital goods are regarded as having been sold by government to itself and are included in gross fixed capital formation. Payments for non-market output sold at non-economically significant prices include partial payments for services rendered by public hospitals or schools.

Two important forms of 'property income' are the dividends paid to general government by public enterprises and the royalties paid to the government for the deposits of mineral or fossil assets, such as the extraction of coal, oil or natural gas. 'Other current transfers' include transfers received by the general government from international institutions or from other governments, either in cash or in kind (e.g. food and military equipment).

'Investment grants' include some payments made by EU institutions, such as certain payments made by the European Structural and Investment Funds, while 'other capital transfers' would include payments by the rest of the world to the government, for example as a result of debt cancellation or as a compensation to government as an owner of a capital good destroyed or damaged by natural disasters.

Table 2: Examples of non-taxation revenue streams (simplified ESA classification)

Non-tax revenue item	Examples
<p><b>Sales of goods and services</b></p> <p><i>ESA: P11+P12+P131</i> <i>EU average (2014): 3.3% of GDP</i></p>	<p>Administrative fees charged for services (licences, passports, visas, radio and television licences);</p> <p>Rentals of produced assets (income from rental of government buildings, road and bridge tolls, permission for use of the road infrastructure over a period of time);</p> <p>Fees at government hospitals and government schools.</p>
<p><b>Current non-tax revenue:</b> property income, other subsidies on production and certain current transfers</p> <p><i>ESA: D4 +D39+D7</i> <i>EU average (2014): 2.2% of GDP</i></p>	<p>Interest from deposits, loans, debt securities;</p> <p>Dividends paid by public enterprises to the general government;</p> <p>Rent income from the use or exploitation of land, sub-soil assets and other natural resources;</p> <p>Gifts and transfers of current nature, in cash or kind, from international institutions to the general government, such as counterpart of food, military equipment, emergency aid after natural disasters.</p>
<p><b>Capital non-tax revenue:</b> investment grants and certain capital transfers</p> <p><i>ESA: D92+D99</i> <i>EU average (2014): 0.8% of GDP</i></p>	<p>Investment grants made by the rest of the world, including those paid by the EU institutions (for example, relevant transfers made by the European Structural and Investment Funds);</p> <p>Gifts and transfers of capital nature, in cash or kind, other than investment grants (for example, cases of debt cancellation).</p>

Source: European System of Accounts – ESA 2010

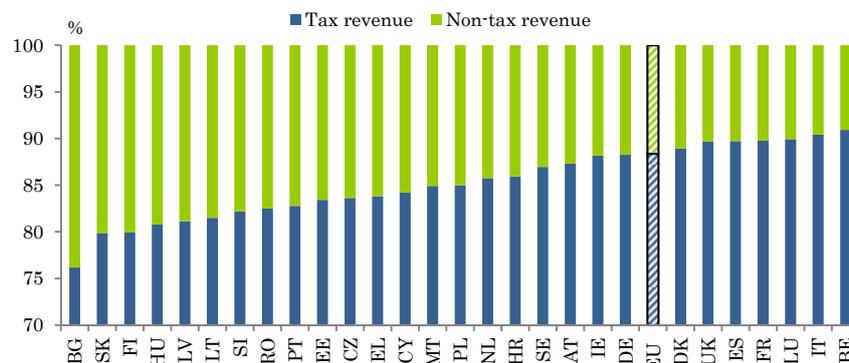
### 3. SIZE AND COMPOSITION OF NON-TAX REVENUE IN THE EU

#### 3.1. LEVELS AND TRENDS OF NON-TAX REVENUE

In this section, non-tax revenue is disaggregated using the GFS non-tax revenue components. The dataset compiled for the purpose of this paper covers the period between 1995 and 2014 for twenty-seven Member States. Data coverage is limited to a shorter period for Croatia. This section presents information about the key statistical features of non-tax government revenue in the Member States, notably on the levels, trends and components.

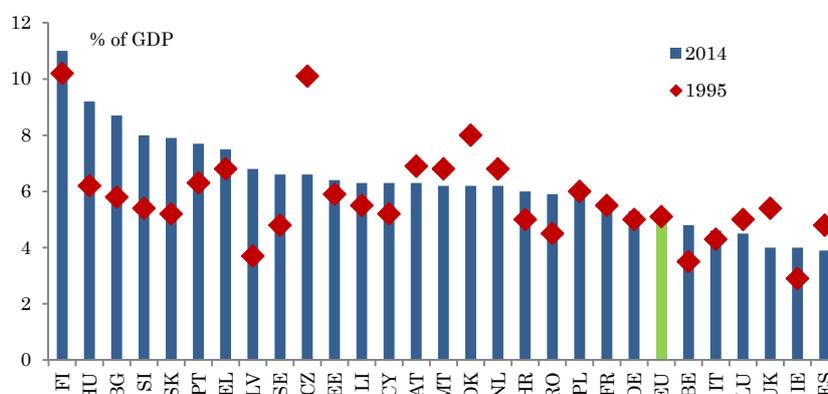
Non-tax income accounts for a significant share of government revenue in most Member States, notwithstanding the fact that tax receipts are by far the most important source of general government revenue in all Member States. In 2014, in the EU as a whole, non-tax revenue accounted for slightly more than one-tenth of total revenue (Figure 1). The share of non-tax receipts in total revenue varied from almost 9% in Belgium and 9½% in Italy to 20% in Finland and Slovakia and around 24% in Bulgaria. Relative to the size of the economy, in 2014, the Member States with the highest non-tax revenue were Finland (11% of GDP) and Hungary (9%), whereas those with the lowest non-tax income were Spain, the UK and Ireland (all slightly less than 4.5% of GDP) (Figure 2). As will be seen below, this heterogeneity in the importance of non-tax revenue to governments across the EU reflects - inter alia - differences in the eligibility to EU structural funds, government policy on user charging and fees for publicly provided goods and services, state holdings of investments and ownership of profitable enterprises.

Figure 1: Share of non-tax and tax revenue in total revenue in the EU in 2014 (Total = 100)



Source: Eurostat, own calculations

Figure 2: Total non-tax revenue as a share of GDP in the EU

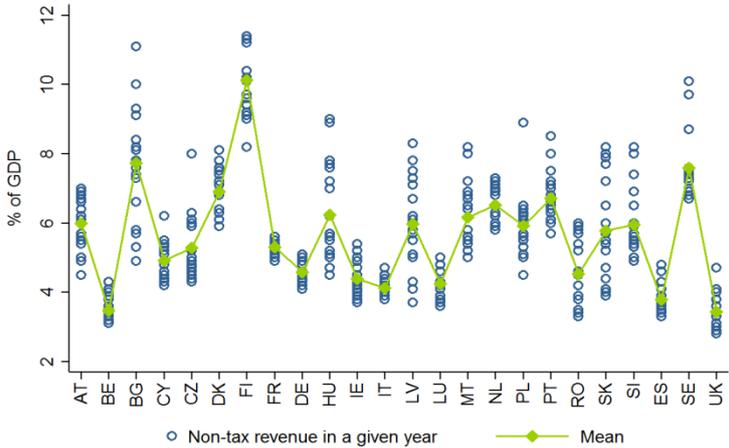


Source: Eurostat, own calculations

When measured as a percent of GDP, non-tax revenues have followed a moderate upward trend over the past ten years. Non-tax intakes in the EU as a whole increased by an annual average of almost 0.08% of GDP, from 4½% of GDP in 2004 to 5¼% in 2014. This ¾ pp. of GDP increase in revenue corresponds to around one-third of the increase in tax revenue over the same period (2.0% of GDP). Most of the EU Member States experienced an increase in their non-tax revenue between 2004 and 2014, although of varying magnitudes. Slovakia and Hungary recorded the highest increase in non-tax intakes since 2004 (4% of GDP), whereas Denmark recorded a drop of almost 1% of GDP.

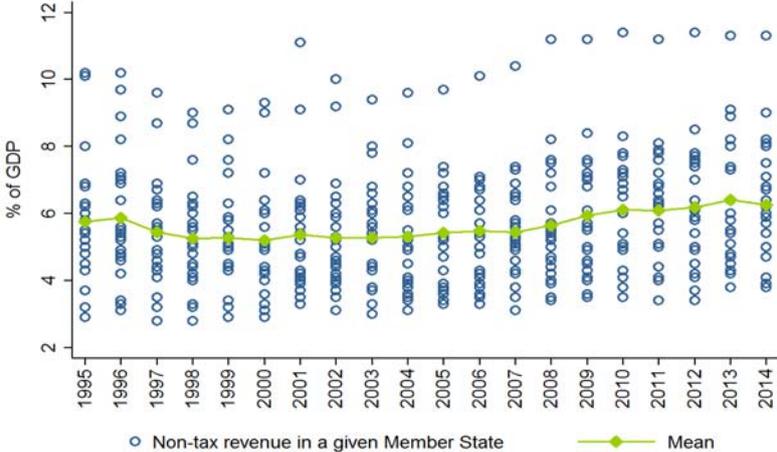
The large heterogeneity in non-tax revenue across EU Member States can be observed in both the level of non-tax revenue and the variation around its mean in individual Member States during the years 1995-2014, as Figure 3 shows. There appears to be no clear linear relationship between the average level and variation in non-tax revenue in Member States. Some Member States with relatively low average levels – including Belgium, Italy, France and Germany – have had very small variation in intakes. The Members States with the highest level of variation in non-tax revenue include Latvia, Slovenia and Hungary, which have average levels of non-tax revenue, and Bulgaria, which had the second highest level of non-tax receipts. Figure 4 shows that the level of non-tax revenue in the EU as a whole over the past fifteen years has been relatively stable at around 5-6% of GDP and there has been no reduction in the dispersion of Member States' levels over time.

Figure 3: Non-tax revenue heterogeneity across Member States, 1995-2014



Source: Eurostat, own calculations

Figure 4: Non-tax revenue heterogeneity in the EU across years, 1995-2014



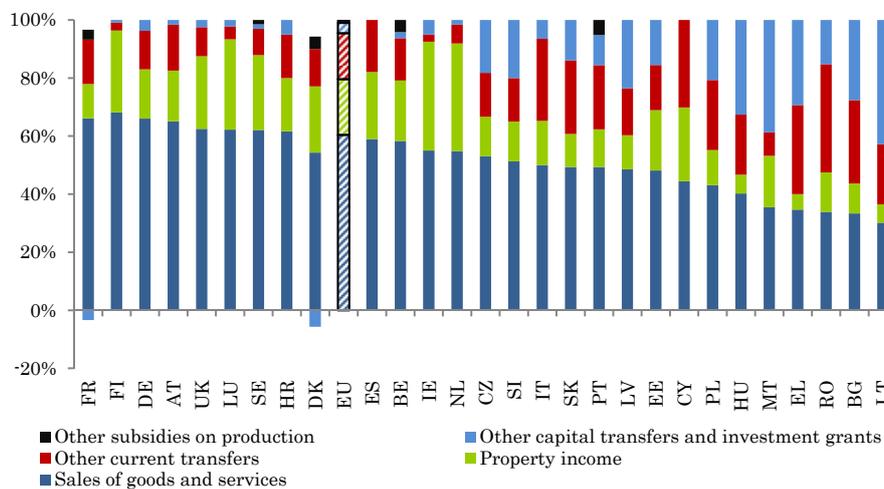
Source: Eurostat, own calculations

### 3.2. COMPOSITION OF NON-TAX REVENUE

The greater part of non-tax revenue consists of intakes from sales of goods and services and income from government property. In 2014, in the EU as a whole, sales from goods and services were slightly more than 3.0% of GDP and accounted for almost three-fifths of non-tax receipts, while property income - the second largest component - amounted to around 1% of GDP, which was one-fifth of total EU non-tax revenue. Other current transfers contributed around 15% of non-tax revenue, while capital transfers represented less than 5% of non-tax income.

Over the period between 2004 and 2014, EU government intakes from sales of goods and services increased gradually by almost ½% of GDP, while property income rose by around ¼% of GDP. Non-tax other current transfers and other capital transfers remained constant at around ¾% of GDP and 0.2% of GDP respectively during the period.

Figure 5: Composition of non-tax revenue in the EU in 2014



Source: Eurostat, own calculations

Although the sources of non-tax revenue vary across the Member States, receipts from sales of goods and services are the largest contributor to non-tax revenue in almost all the Member States. Sales of goods and services in 2014 accounted for almost two-thirds of total non-tax revenue in France, Finland, Germany, and Austria. The Member States with the highest share of non-tax revenue from property income are Ireland, the Netherlands and Luxembourg, with shares exceeding 30% in 2014. In Ireland, this reflects the income accruing to the government as a result of assistance to the financial sector, mainly consisting of bank guarantee fee income, interest earnings and Central Bank surplus income. Hickey and Smyth (2015) note that this income is expected to fall as the effects of the financial crisis wind down. In the Netherlands, more than half of the government property income was from rents. In Finland, four-fifths of the property income was from investment income, predominantly interest from holdings of financial assets and distributed dividends of corporations. However, in 2015, the low interest rate environment contributed to a significant reduction in the Finnish government income on financial assets, which more than offset the savings from lower interest expenditure.<sup>5</sup>

<sup>5</sup> European Commission (2016), Assessment of the 2016 Stability Programme for Finland (May 2016), Section 3.1 (Deficit developments in 2015), p.5.

Non-tax revenue from other current transfers, primarily from international current transfers that include grants from European structural funds, tend to be more important in countries that became EU Members in 2004 and 2007. For example, other current transfers account for almost 40% of total non-tax income in Romania, 30% in Bulgaria and 25% in Poland. Italy and Cyprus also have relatively high shares of intakes from non-tax current transfers, although this is not due to international transfers. The EU Member States which in 2014 had significant shares of revenue from non-tax capital transfers, which include EU funds to finance investment projects, are Lithuania (43% of total non-tax income), Malta (38%), Bulgaria (28%), Hungary (32%), and Greece (29%).

## 4. FISCAL RISK ASSOCIATED WITH NON-TAX REVENUE

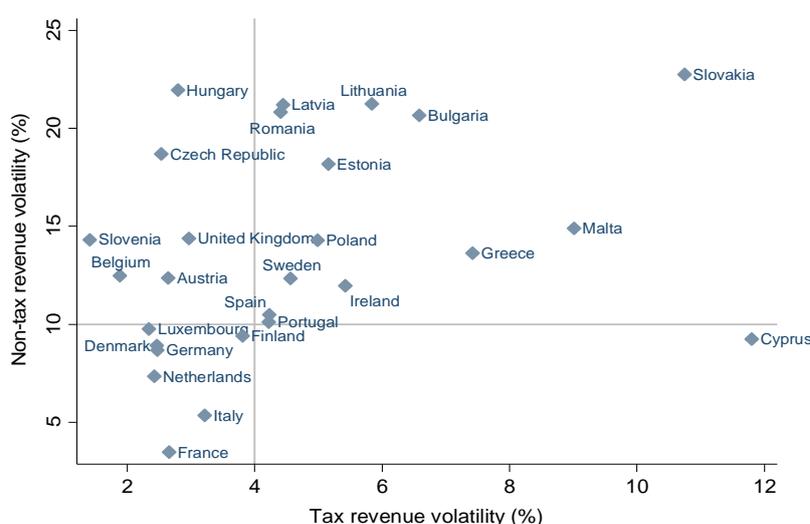
This section presents estimates of the volatility of non-tax revenue in the EU as a means to examine the fiscal risk from unexpected adverse developments in non-tax revenue receipts. The relatively simple measurements of volatility presented below can help to identify the uncertainty around annual projections for non-tax receipts, and therefore provide a measure for taking into account such uncertainty in the fiscal plans.

### 4.1. VOLATILITY IN ABSOLUTE TERMS AND RELATIVE TO ITS MEAN

The standard deviation provides a measure of the absolute level of volatility in revenue. The Member States with the highest standard deviation, and therefore greater volatility, for non-tax revenue are Bulgaria (1.6% of GDP), Hungary (1.4%), Slovakia (1.3%) and Latvia (1.3%). On the other hand, France (0.2% of GDP), Italy (0.2%), Germany (0.4%), Spain (0.4%) and Luxembourg (0.4%) have the lowest absolute volatility in non-tax revenue.

A relative measure of volatility can be obtained by dividing the standard deviation of the non-tax revenue-to-GDP ratio with the average value of the ratio. This coefficient of variation provides a more useful measure than the absolute volatility in non-tax revenue. For example, although the standard deviations for non-tax revenue in Finland and Romania are practically identical (0.9% of GDP), the average level of non-tax revenue in Finland (10% of GDP) is significantly higher than in Romania (4.5%), which implies that the annual percentage fluctuations in non-tax revenue are actually significantly higher in Romania than in Finland. Figure 6 shows the coefficient of variation for taxation and non-tax revenue for the EU Member States. Table 2 presents the measurement of the absolute and relative volatility of tax and non-tax revenue in terms of this coefficient of variation that is in fact a normalised standard deviation. On average for the EU Member States, the relative volatility of non-tax revenue is three times higher than that for taxation revenue. When comparing the volatility of non-tax revenue across countries, coefficients of variation are highest for Slovakia, Hungary, Lithuania, Latvia and Romania, while it is lowest for Italy and France. The non-tax revenue in the former group of countries is more than six times as volatile, relative to the average, as the non-tax revenue in France and Italy. Cyprus is the only Member State where taxation revenue is more volatile relative to its mean than non-taxation revenue.

Figure 6: Relative volatility of tax and non-tax revenue in the EU, 1995-2014



Source: Eurostat, own calculations

Assuming a normal distribution, approximately two-thirds of the recordings of annual revenue in a Member State fall within the range of plus or minus one standard deviation around the mean (and 90% fall between two standard deviations, plus and minus). As can be seen in the last two columns in Table 3 below, given the average standard deviation for non-tax revenue for the EU Member States of 0.75% between 1995 and 2014 and the average EU level of non-tax revenue of 5.7% of GDP over the same period, one can conclude that the average EU non-tax revenue falls between 4.9% of GDP and 6.5% of GDP roughly two-thirds of the time.

Table 3: Volatility of tax and non-tax revenue in the EU, 1995-2014

Country	Average revenue 1995-2014			Absolute volatility (standard deviation)			Relative volatility (coefficient of variation)			Normalised standard deviation band		
	Non-tax	Tax	Total	Non-tax	Tax	Total	Non-tax	Tax	Total	Non-tax	Tax	Total
	% of GDP			% of GDP			%			% of GDP		
Austria	6.0	43.0	49.0	0.7	1.1	0.8	12.3	2.6	1.6	(5.3 - 6.8)	(41.9 - 44.1)	(48.2 - 49.8)
Belgium	4.1	45.5	49.5	0.5	0.9	1.2	12.5	1.9	2.5	(3.5 - 4.6)	(44.6 - 46.3)	(48.3 - 50.8)
Bulgaria	7.9	28.7	36.5	1.6	1.9	2.9	20.7	6.6	7.9	(6.2 - 9.5)	(26.8 - 30.6)	(33.6 - 39.4)
Cyprus	5.2	29.7	34.9	0.5	3.5	3.6	9.2	11.8	10.2	(4.7 - 5.7)	(26.2 - 33.2)	(31.3 - 38.4)
Czech Republic	5.4	33.4	38.9	1.0	0.8	1.5	18.7	2.5	3.8	(4.4 - 6.4)	(32.6 - 34.3)	(37.4 - 40.3)
Denmark	6.9	47.9	54.8	0.6	1.2	0.9	8.9	2.5	1.7	(6.3 - 7.5)	(46.7 - 49.1)	(53.9 - 55.7)
Estonia	5.9	32.2	38.1	1.1	1.7	2.2	18.2	5.2	5.7	(4.8 - 7.0)	(30.5 - 33.9)	(36.0 - 40.3)
Finland	10.1	43.2	53.3	1.0	1.6	1.4	9.4	3.8	2.7	(9.2 - 11.1)	(41.6 - 44.9)	(51.9 - 54.7)
France	5.3	45.0	50.2	0.2	1.2	1.2	3.5	2.7	2.5	(5.1 - 5.5)	(43.8 - 46.1)	(49.0 - 51.5)
Germany	4.6	39.5	44.1	0.4	1.0	1.0	8.7	2.5	2.3	(4.2 - 5.0)	(38.5 - 40.5)	(43.1 - 45.2)
Greece	7.1	33.7	40.8	1.0	2.5	3.1	13.6	7.4	7.7	(6.1 - 8.0)	(31.2 - 36.2)	(37.6 - 43.9)
Hungary	6.2	38.2	44.4	1.4	1.1	1.8	22.0	2.8	4.1	(4.9 - 7.6)	(37.1 - 39.3)	(42.6 - 46.2)
Ireland	4.4	30.8	35.1	0.5	1.7	1.8	12.0	5.4	5.2	(3.8 - 4.9)	(29.1 - 32.4)	(33.3 - 37.0)
Italy	4.1	41.1	45.2	0.2	1.3	1.5	5.3	3.2	3.2	(4.7 - 5.7)	(39.8 - 42.4)	(43.8 - 46.7)
Latvia	6.0	28.9	34.8	1.3	1.3	1.6	21.2	4.4	4.5	(4.7 - 7.2)	(27.6 - 30.2)	(33.3 - 36.4)
Lithuania	5.1	29.4	34.5	1.1	1.7	1.8	21.2	5.8	5.3	(4.0 - 6.2)	(27.7 - 31.2)	(32.7 - 36.4)
Luxembourg	4.3	38.8	43.2	0.4	0.9	1.1	9.8	2.3	2.7	(3.9 - 4.7)	(37.9 - 39.7)	(42.0 - 44.3)
Malta	6.2	30.9	37.1	0.9	2.8	2.3	14.9	9.0	6.1	(5.2 - 7.1)	(28.2 - 33.7)	(34.9 - 39.4)
Netherlands	6.5	36.8	43.2	0.5	0.9	1.0	7.3	2.4	2.2	(6.0 - 7.0)	(35.9 - 37.7)	(42.3 - 44.2)
Poland	5.9	34.4	40.3	0.8	1.7	2.0	14.3	5.0	5.0	(5.1 - 6.8)	(32.7 - 36.1)	(38.3 - 42.3)
Portugal	6.7	33.9	40.6	0.7	1.4	1.9	10.1	4.2	4.7	(6.0 - 7.4)	(32.5 - 35.4)	(38.7 - 42.6)
Romania	4.5	28.2	32.7	0.9	1.2	1.3	20.8	4.4	4.1	(3.6 - 5.5)	(26.9 - 29.4)	(31.3 - 34.0)
Slovakia	5.8	32.2	38.0	1.3	3.5	3.0	22.8	10.7	7.9	(4.5 - 7.1)	(28.7 - 35.6)	(35.0 - 41.0)
Slovenia	5.9	37.3	43.2	0.9	0.5	0.9	14.3	1.4	2.0	(5.1 - 6.8)	(36.7 - 37.8)	(42.4 - 44.1)
Spain	3.8	34.1	38.0	0.4	1.4	1.4	10.5	4.2	3.6	(3.4 - 4.2)	(32.7 - 35.6)	(36.6 - 39.3)
Sweden	7.6	46.3	53.9	0.9	2.1	2.6	12.3	4.6	4.9	(6.6 - 8.5)	(44.2 - 48.4)	(51.2 - 56.5)
United Kingdom	3.4	35.2	38.6	0.5	1.0	1.3	14.4	3.0	3.3	(2.9 - 3.9)	(34.2 - 36.2)	(37.3 - 39.9)
<i>EU average</i>	<i>5.7</i>	<i>35.9</i>	<i>41.7</i>	<i>0.8</i>	<i>1.5</i>	<i>1.7</i>	<i>13.6</i>	<i>4.5</i>	<i>4.3</i>	<i>(4.9 - 6.4)</i>	<i>(34.7 - 37.8)</i>	<i>(40.2 - 43.7)</i>

Source: Eurostat, own calculations

## 4.2. CONTRIBUTION OF NON-TAX REVENUE TO TOTAL REVENUE VOLATILITY

The contribution of non-tax revenue to total revenue volatility can also be examined by decomposing the total revenue variance into the variance of tax revenue, the variance of non-tax income, and the co-movement (or covariance) between tax revenue and the non-tax income.<sup>6</sup> In the EU, on average, non-tax revenue accounts for around 30% of total revenue volatility, which is well above the share of non-tax revenue in total revenue of 10% (see Table A2 in Annex). Using this measure, non-tax revenue has

<sup>6</sup>  $\text{Var}(\text{Total Revenue}) = \text{Var}(\text{Tax}) + \text{Var}(\text{Non-tax}) + 2 \cdot \text{Cov}(\text{Tax}, \text{Non-tax})$ . If tax revenue and non-tax income are independent variables,  $\text{Cov}(\text{Tax}, \text{Non-tax}) = 0$  and  $\text{Var}(\text{Total Revenue}) = \text{Var}(\text{Tax}) + \text{Var}(\text{Non-tax})$ . The covariance between tax and non-tax revenue can reflect the effect of macroeconomic developments on both revenue streams, such as the effect of growing private consumption expenditure on indirect taxes and on government sales of goods and services.

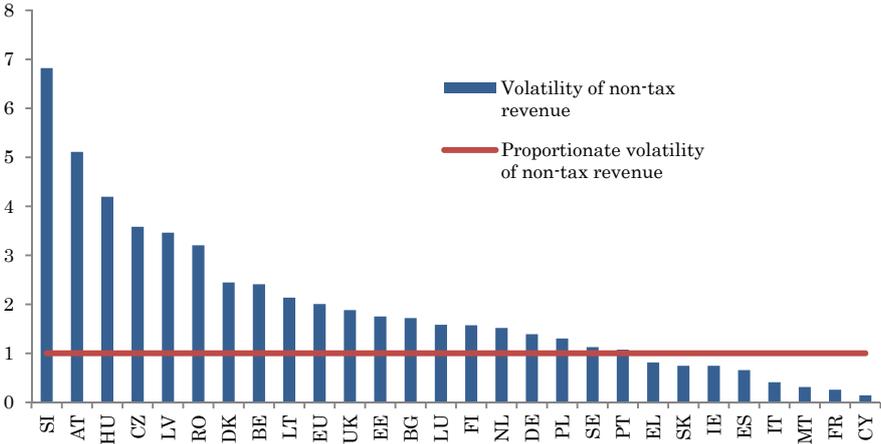
been a particularly important driver of total revenue volatility in Slovenia, Austria, Latvia, Hungary, Romania, the Czech Republic and Finland. By contrast, non-tax revenue has contributed marginally to total revenue volatility in Cyprus, France, and Italy.

In around half of the Member States, the direction of change in non-tax and tax revenue tends to be similar, as shown by the positive covariance. In this case, non-tax and tax revenue contribute jointly to the variability in total revenue as a percentage of GDP. In Portugal, Belgium, Sweden, Greece and Bulgaria this co-movement accounts for around 25-30% of the total revenue variance.

By contrast, the negative covariance between non-tax and tax revenue in Finland, Denmark, Malta, Slovenia, Latvia, Lithuania, Romania, Slovakia and Spain reduced total revenue volatility in these Member States between 1995 and 2014. Moreover, with the exception of Slovenia, Latvia, Romania, Lithuania, the contribution of this inverse relationship to revenue stability in these Member States outweighed the separate contribution of non-tax revenue to total revenue volatility. In this case, non-tax revenue served as a tool for revenue diversification that contributed to stabilise government revenue over the business cycle. The extent to which this was coincidental or whether it reflected deliberate policy choices needs to be assessed on a country-by-country basis.

Assuming that the covariance between non-tax and tax revenue is arbitrarily assigned to the variances of tax and non-tax revenue in proportion to their respective shares in total revenue, Figure 7 shows the extent to which the contribution of the volatility (variance) of non-tax revenue to total revenue volatility is proportionately greater or less than its share in total revenue. In particular, a measure of the revenue-volatility-augmenting effect of non-tax revenue can be obtained by calculating the ratio of the contribution of the variance of non-tax revenue to total revenue variance to the share of non-tax revenue in total revenue<sup>7</sup>. A value of 1 indicates that the contribution of non-tax revenue to total revenue volatility is equal to the share of non-tax revenue in total revenue. Figure 7 indicates that non-tax revenue contributes to significantly augmenting total revenue volatility in Slovenia, Austria, Hungary, the Czech Republic and Latvia, whereas the volatility in non-tax revenue is proportionately low in Cyprus, France, Malta and Italy.

Figure 7: Measure of amplification/mitigation of revenue volatility by non-tax revenue (revenue volatility amplification above the red line and revenue volatility mitigation below the line)



Source: Eurostat, own calculations

Note: The blue bar represents a measure of relative volatility, that is, the ratio of the contribution of the variance of non-tax revenue to total revenue variance to the share of non-tax revenue in total revenue. The red line corresponds to a value of 1, indicating that the contribution of non-tax revenue to total revenue volatility is strictly equal to the share of non-tax revenue in total revenue. If the blue bar is higher than the red line, then non-tax revenue contributes to amplify the volatility of total revenue. Conversely, if the blue bar is lower than the red line, non-tax revenue contributes to mitigate the volatility of total revenue.

<sup>7</sup> Measure of amplification/mitigation of revenue volatility by non-tax revenue = [Contribution of Var(Non-tax) to Var(Total Revenue) %] / [Share of Non-tax in Total Revenue %]

#### 4.3. SOME CONSIDERATIONS ON THE IMPLICATION FOR EU FISCAL SURVEILLANCE

The high volatility of non-tax revenue appears to be a source of fiscal risk, which would affect the structural budget balance and could drive a difference between the planned fiscal effort of the government and the outcome of fiscal indicators. When assessing compliance with the fiscal rules, namely the Stability and Growth Pact, it is important to bear in mind the volatility of non-tax revenue, which could make their projection challenging. Prudence should be exercised when forecasting non-tax revenue, to avoid overestimations and thereby the risk of future revenue shortfalls.

Moreover, the volatility of non-tax revenue is likely to be reflected differently by the two indicators used to assess discretionary fiscal policy in EU surveillance, namely, the change in the structural budget balance and the 'expenditure benchmark' (i.e. growth rate of public expenditures net of discretionary revenue measures, minus the average medium-term growth rate of potential output). The structural balance should be affected in full by a change in non-tax revenue, although it may not be structural in nature. The expenditure benchmark will only be influenced by a change in discretionary fiscal policy, that is, a new governmental measure affecting non-tax revenue, such as a decision to modify the pricing policy of the public production of goods and services or to change the renting policy of public real property. This may be considered as a further reason for preferring the expenditure benchmark - often considered as more predictable and easier to communicate - since many changes in non-tax revenue cannot be attributed to government policies, but to external factors, such as price inflation, interest rates or the state of the rental market.

# 5. MACROECONOMIC DETERMINANTS OF NON-TAX REVENUE

## 5.1. DATA AND ESTIMATION STRATEGY

This section investigates to what extent macroeconomic variables explain some of the observed differences in non-tax revenue in the EU. Using a panel econometric approach with country fixed effects, we investigate the drivers of within country changes in non-tax revenue for a sample of 26 EU Member States over the period 1995-2014.<sup>8</sup>

The analysis is based on the following basic specification:

$$Ntr_{it} = \alpha_i + X'_{it}\beta + u_{it}$$

where  $Ntr_{it}$  is non-tax revenue as a percent of GDP,  $X_{it}$  is the vector of explanatory variables,  $\alpha_i$  captures the country fixed effects and  $u_{it}$  is the unobserved error term. The set of possible explanatory variables includes tax revenue, central government expenditure, household consumption, corporate profitability and other macroeconomic variables. Tax revenue and central government expenditure are measured as a percent of GDP. Central government expenditure is measured as general government expenditure less local government spending, in order to exclude central government transfers to local governments.<sup>9</sup> Local government spending is used as a measure for fiscal decentralisation. *Household consumption* (as a percent of GDP) is used to proxy the demand for goods and services produced by the public sector. *Corporate profitability* is measured as the gross operating surplus and is used as a potential proxy for the profitability of the state-owned enterprises. Other explanatory variables include: GDP per capita; the stock of financial assets held by governments; and nominal interest rates, as measured by the 10-year sovereign bond yield.

An alternative measure of non-tax revenue is also tested, consisting of revenue from property income and from sales of goods and services and excluding other current and capital transfers (notably the EU structural funds).

The term  $\alpha_i$  represents a set of country fixed effects and  $u_{it}$  captures all the omitted factors. In all the notations, the subscript  $i$  indicates the country and subscript  $t$  indicates the time. Country fixed effects allow focusing on within-country changes instead of cross-country differences. This empirical approach is based on the within-transformation method which neutralizes within-country variation in all the terms of the above specification, by calculating the average for each country  $i$  over time and taking the difference for each year  $t$  between each variable and the average over time.

Other things constant, governments with higher levels of expenditure are a priori expected to raise higher income from non-tax sources. By contrast, an inverse relationship is expected between government tax revenue and non-tax income, because higher non-tax revenue can be used to reduce the tax burden. Fiscal decentralisation can potentially lead to higher user charges and to reduced taxation.<sup>10</sup> Subnational governments are expected to be more directly accountable to their constituents

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<sup>8</sup> We exclude Croatia and Greece because of some limitations in the available data sets.

<sup>9</sup> As a result, the variable 'central government expenditure' actually consists of the spending of central and state governments and the social security funds controlled by these units.

<sup>10</sup> An example of an empirical research concluding that own-revenue decentralisation leads to a reduction in the tax burden is presented in European Commission (2012), Fiscal decentralisation and fiscal discipline, Quarterly Report on the Euro Area No. 4/2012.

and it should be easier for them to charge users directly for locally-provided public goods or services, such as water provision, public transport, refuse disposal, and health and long-term care facilities.

A positive relationship is expected between consumption spending and non-tax revenue, since the former is arguably also the base for government sales of good and services. Non-tax revenue from government holdings from financial assets is expected to be positively influenced by corporate profitability, the stock of government holdings of financial assets and interest rates. Higher GDP per capita is expected to contribute to lower non-tax revenue from EU structural and cohesion funds, which primarily target those regions whose GDP per capita is below 75% of the EU average.

## 5.2. EMPIRICAL RESULTS FOR THE DRIVERS OF NON-TAX REVENUE

Table 4 below summarises the results of our regression analysis. The independent variable in the first three regression specifications is total non-tax revenue. The first regression includes most of the above-mentioned potential explanatory variables. Household consumption, corporate profitability, and government holdings of financial assets are not found to be statistically significant. Specifications including GDP per capita and the long-term interest rate also did not indicate a significant influence of these variables on non-tax revenue in the EU Member States. Following repeated regressions, we find that taxation revenue and general government expenditure have a statistically significant effect on non-tax revenue (regression 2). The variables have the expected signs. An increase in tax revenue by 1% of GDP is associated with a drop in non-tax revenue by 0.1% of GDP, whereas a 1% of GDP increase in general government expenditure is associated with a rise in the non-tax-to-GDP ratio by 0.1 percentage point.

In the third regression, we test for the possibility that spending by local governments has a different relation to non-tax revenue compared to spending by central government expenditure. Although the estimated coefficient for local government spending is higher than that for central government expenditure, as can be seen in the results for the third regression, the two coefficients are not found to be significantly different from each other. The results indicate that non-tax revenue is influenced by the total size of the general government, whereas fiscal decentralisation (as measured by the relative size of central and local government spending) does not contribute to higher non-tax revenue on average in the EU.

The same specifications were run using a measure of non-tax revenue excluding current and capital transfers, notably those from EU structural and cohesion funds. The use of this adjusted measure of the dependent variable yields a statistically significant effect from government holdings of financial assets and a strong improvement in the explanatory power of the model. This model was found to explain almost 30% of the cross-sectional variation in non-tax revenue. The effect of local government spending on non-tax revenue was again not found to be different from central government spending. Overall, the results show large unobserved country fixed effects, which underscores the need for more country-specific analysis to better understand how non-tax receipts can support an efficient and counter-cyclical government revenue strategy.

Several statistical tests were carried out to check the assumptions underlying the OLS model. The homoscedasticity condition of the error term is verified by computing a Modified Wald statistic for groupwise heteroskedasticity. The homoskedasticity assumption is rejected. Moreover, using the Wooldridge test for autocorrelation in panel data, we conclude that the error term has first-order autocorrelation. Therefore, Table 4 reports standard errors that are robust to serial correlation and heteroskedasticity (cluster robust).

Table 4: Regression results of non-tax revenue determinants

Variables	Non-tax revenue			Adjusted non-tax revenue	
	(1)	(2)	(3)	(4)	(5)
Dependent variable: <i>non-tax revenue-to-GDP ratio</i>					
Tax revenue	-0.07 (0.05)	-0.11** (0.05)	-0.11** (0.05)	-0.08** (0.04)	0.08** (0.04)
Size of the government		0.1*** (0.02)		0.08*** (0.01)	
Central government spending	0.09*** (0.02)		0.11*** (0.02)		0.08*** (0.01)
Local government spending	0.22*** (0.07)		0.21*** (0.06)		0.12** (0.04)
Government financial assets	0.01 (0.01)			0.02** (0.01)	0.02** (0.01)
Corporate profitability	0.06 (0.04)				
Household consumption	-0.01 (0.04)				
Constant	-0.33 (5.13)	4.90** (1.74)	3.68** (1.55)	3.53** (1.58)	2.84** (1.41)
Number of observations	426	520	520	436	436
Number of countries	26	26	26	26	26
R-square	0.345	0.139	0.276	0.285	0.581

Note: Standard errors in parentheses, \*p<0.1; \*\*p<0.05; and \*\*\*p<0.01. Estimated using fixed effects panel regressions with robust standard errors clustered at the country level. In models (4) and (5), the dependent variable of non-tax revenue is adjusted by excluding the components of other current and capital transfers and investment grants from the previously defined measure of non-tax revenue.

### 5.3. DIRECTION OF CAUSALITY: NON-TAX REVENUE VERSUS TAX REVENUE AND GOVERNMENT SPENDING

Using Granger causality tests, we examine the direction of causality between non-tax revenue on one hand and tax revenue and expenditure on the other hand. Tax revenue and expenditure are said to 'Granger-cause' non-tax revenue if their past values contain information that helps to predict non-tax revenue.

The relationship of causality can take four different forms. The first hypothesis is that governments first decide on taxation or make spending commitments, which then guides their decision on how much revenue should be raised from non-tax sources. For example, lower taxation may lead governments to raise additional revenue from non-tax sources, while governments might try to finance higher spending through user charges. The second hypothesis is the reverse causality, whereby intakes from non-tax sources influence government's decisions on taxation and the expenditure that can be committed. Morrison (2009) argues that in democracies the presence of non-tax revenue leads to a reduction in the desire of citizens to raise tax revenue if there are diminishing marginal returns to

government spending. In the third scenario, there is no causality, with developments in taxation revenue and expenditure not influencing decisions on non-tax revenue, and vice-versa. Finally, decisions may be taken simultaneously (fiscal synchronisation), with changes in tax revenue or expenditure rapidly influencing non-tax revenue.

Standard Augmented Dickey-Fuller tests were applied to examine the time series properties of the ratios of non-tax revenue, tax revenue and government expenditure to GDP. Granger causality was tested using the first differences of the ratios, which were found to be stationary for most of the EU Member States.<sup>11</sup> Table 5 below categorises the Member States according to the direction of causality.

Table 5: Results of Granger causality tests between non-tax revenue, tax revenue and expenditure, 1996-2014

Tax revenue → Non-tax revenue	Non-tax revenue → Tax revenue	No causality	Synchronisation	Expenditure → Non-tax revenue	Expenditure → Non-tax revenue	No causality	Synchronisation
EE	LU	BE CY		EE	FR	BE LT	CZ
EL	MT	BG LT		IE	LV	BG HU	LU
IT	RO	CZ NL		IT	PT	DK MT	SE
HU	SI	DK AT		AT	SI	DE NL	
PL	SK	DE PT		SK	FI	EL PL	
	FI	IE SE		UK		ES RO	
		ES UK				CY	
		FR					

The table above shows significant differences among countries in the causal relationship between non-tax revenue and taxation or government spending. The results suggest unidirectional causality running from tax receipts to non-tax revenue for Estonia, Greece, Italy, Hungary and Poland. Evidence of reverse causation (i.e. prior values of non-tax revenue can be used to predict future values of tax revenue) was found for Luxembourg, Malta, Romania, Slovenia, Slovakia and Finland. In fifteen EU Member States no clear short-term causal relationship between tax and non-tax revenue was found. Government spending is found to Granger cause non-tax revenue in Estonia, Ireland, Italy, Austria, Slovakia and the United Kingdom, whereas the causality is found to run from non-tax revenue to spending in France, Latvia, Portugal, Slovenia and Finland. In the case of the Czech Republic, Luxembourg and Sweden, this study finds a feedback relationship between non-tax revenues and spending, supporting the ‘synchronisation’ hypothesis. In the case of thirteen Member States, the results support none of the hypotheses of causality between non-tax revenue and spending.

<sup>11</sup> The results of the ADF tests are reported in Table A3 in Annex.

## 6. CONCLUSION

This assessment aimed at providing an overview at the EU level of the significance of non-tax revenue using comparable national accounts data. Although tax receipts are by far the most important source of general government revenue in the EU member States, government intakes from non-tax sources merit examination. Such revenue accounts for an average of around one-tenth of total government revenue, or 5% of GDP, in the Member States. Moreover, the relative importance of non-tax revenue has increased over recent years, growing by annual average of 4% over the past ten years compared to the annual increase of tax revenue by 2¾%.

The greater part of non-tax revenue consists of intakes from sales of goods and services (including those produced and consumed within government) and from income from government assets. However, Member States that joined the Union in 2004 and 2007 tend to have relatively larger shares of non-tax current receipts, notably from EU funds. Reliance on non-tax revenue is higher for local governments compared to the central government. This is primarily due to the receipt of central government transfers, although there is also greater recourse to user charges at that level of government. In a few Member States, notably in Finland, Sweden and Luxembourg, social security funds also provide a significant stream of non-tax income for the general government.

There has been no reduction in the heterogeneity of the levels, volatility and composition of non-tax revenue across the EU Member States over the past twenty years. The volatility of non-tax revenue relative to its mean is on average three times higher than that for taxation revenue. As a result, non-tax income accounts for one-third of the absolute volatility of average total government revenue in the EU, which is more than three times its share in total revenue. Non-tax income was inversely related to taxation revenue in nine Member States between 1995 and 2014, thereby partly offsetting the pro-cyclical variation in tax intakes and contributing to stabilising total revenue.

The panel data analysis indicates that higher government spending is associated with increased use of non-tax revenue sources, while lower tax receipts are associated with higher non-tax revenue. Together with the level of government holdings of financial assets, these variables can explain almost 30% of the cross-sectional variation in non-tax revenue. The effect of local government spending on non-tax revenue is not found to be different from central government spending, which suggests that the differences in the degree of fiscal decentralisation across EU Member States do not explain the heterogeneity in the use of non-tax income sources. Granger causality tests also show significant differences among countries in the causal relationship between non-tax revenue and taxation or government spending. Overall, the results show large unobserved country fixed effects, which underscores the need for complementary country-specific analysis to better understand how non-tax receipts can support an efficient and counter-cyclical government revenue strategy.

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## ANNEX: EXAMPLES OF NON-TAX REVENUE AND RESULTS

Table A1: Examples of non-taxation revenue streams classified as ESA resources

Non-tax revenue item	Examples
Sales of goods and services	<p>Issuance of licences and broader administrative fees for certain services where government exercises its regulatory function, including driving licences, passports, visas, court fees, radio and television licences when broadcasting services are provided by public authorities;</p> <p>Rentals of produced assets, such as income from rental of government buildings, road and bridge tolls, permission for use of the road infrastructure over a period of time, charges for use of public facilities (e.g. sport centres) and fees for entry to public buildings;</p> <p>Incidental sales by non-market establishment, such as fees at government hospitals, merchandise sold by museums, publications sold by government entities;</p> <p>Output of market establishments included in the government sector, such as weapons factories that are part of the government, canteens for government employees);</p> <p>Good and services produced for own capital formation, including own-account construction, R&amp;D and software, and machine tools produced by government entities;</p> <p>Intakes from non-market output sold at not economically significant prices, such as partial payments for services rendered by hospitals and schools.</p>
Property income	<p>Interest from deposits, loans, debt securities or other accounts receivable;</p> <p>Dividends paid by public enterprises to the general government;</p> <p>Withdrawals from the income of quasi-corporations;</p> <p>Investment income payable on pension entitlements;</p> <p>Rent income from the use or exploitation of non-produced assets, such as land, sub-soil assets (including royalties for the deposits of minerals or fossil fuels, notably coal, oil, natural gas), and other natural resources.</p>
Other current transfers	<p>Current transfers to the general government from international institutions in cash or kind such as counterpart of gifts, food and military equipment;</p> <p>Fines and penalties that result from decisions of courts of law or quasi-judicial bodies.</p>
Other subsidies on production	<p>Subsidies received by general government sub-sectors, notably on payroll or workforce, on the employment of particular persons such as persons unemployed for longer periods, on the costs of training schemes;</p> <p>Subsidies to reduce pollution.</p>
Other capital transfers and investment grants	<p>Uncompensated transfers of asset ownerships or cancellations of liabilities by creditors;</p> <p>Payments to government for capital goods destroyed or damaged by acts of war, other political events or natural disasters;</p> <p>Large gifts and donations to general government to cover costs of buildings, libraries, laboratories;</p> <p>Investment grants made by the rest of the world include those paid by the EU institutions (for example, relevant transfers made by the European Structural and Investment Funds).</p>

Source: European System of Accounts – ESA 2010

Table A2: Decomposition of variance of total revenue, 1995 - 2014

Country	Contribution to total revenue variance		
	Var (Tax revenue)	Var (Non-tax revenue)	2*Cov (Tax revenue, Non-tax revenue)
Austria	2.01	0.86	-1.87
Belgium	0.48	0.17	0.35
Bulgaria	0.42	0.31	0.26
Cyprus	0.96	0.02	0.02
Czech Republic	0.33	0.47	0.20
Denmark	1.64	0.44	-1.09
Estonia	0.59	0.25	0.17
Finland	1.34	0.45	-0.79
France	0.93	0.02	0.05
Germany	0.89	0.15	-0.04
Greece	0.64	0.10	0.26
Hungary	0.35	0.58	0.07
Ireland	0.82	0.08	0.09
Italy	0.81	0.02	0.16
Latvia	0.66	0.64	-0.31
Lithuania	0.88	0.35	-0.23
Luxembourg	0.63	0.13	0.24
Malta	1.51	0.16	-0.67
Netherlands	0.85	0.24	-0.09
Poland	0.73	0.18	0.09
Portugal	0.55	0.12	0.32
Romania	0.86	0.49	-0.35
Slovakia	1.34	0.20	-0.53
Slovenia	0.38	0.99	-0.37
Spain	1.10	0.09	-0.19
Sweden	0.64	0.13	0.23
United Kingdom	0.69	0.15	0.16
<i>EU average</i>	<i>0.85</i>	<i>0.29</i>	<i>-0.14</i>

Table A3: ADF test on stationarity of tax revenue, non-tax revenue and government spending series, 1995 - 2014

Country	Level			First difference		
	Non-tax revenue	Tax revenue	Expenditure	Non-tax revenue	Tax revenue	Expenditure
Austria	-3.072	-1.918	-2.864	-4.284**	-4.014**	-4.508***
Belgium	-1.656	-0.9	-1.937	-3.523*	-3.173***	-5.168***
Bulgaria	-1.865	-2.034	-3.06	-3.419*	-3.695**	-4.694***
Cyprus	-2.117	-1.751	-3	-3.290***	-3.389*	-2.683***
Czech Republic	-4.107**	-2.733	-2.705	-6.430***	-4.094**	-6.439***
Denmark	-1.245	-0.345	-1.726	-3.631**	-2.425**	-3.382*
Estonia	-3.701**	-2.398	-2.279	-5.867***	-4.352**	-3.530*
Finland	-2.35	-0.916	-1.8	-3.281***	-6.154***	-3.461*
France	-2.402	-0.396	-1.84	-4.013**	-3.946**	-4.048**
Germany	-1.976	-1.822	-4.647***	-4.558***	-4.172**	-4.735***
Greece	-2.813	-1.516	-3.028	-5.143***	-4.293**	-3.982**
Hungary	-1.03	-2.96	-4.727***	-6.738***	-3.695**	-5.110***
Ireland	-1.951	-1.617	-2.339	-1.627*	-2.961***	-4.546***
Italy	-0.419	-1.378	-2.129	-5.255***	-4.412***	-5.084***
Latvia	-2.67	-1.227	-2.099	-4.435***	-3.442***	-3.3*
Lithuania	-1.558	-2.506	-2.572	-4.788***	-2.85	-4.822***
Luxembourg	-2.58	-2.751	-2.306	-4.156**	-4.945***	-3.17
Malta	-2.039	-2.493	-4.431**	-4.112**	-8.743***	-6.886***
Netherlands	-2.589	-1.006	-4.977***	-4.199**	-5.165***	-4.384***
Poland	-3.661**	-1.949	-2.485	-7.183***	-3.442*	-5.248***
Portugal	-2.693	-3.17	-2.562	-5.752***	-5.981***	-3.049***
Romania	-5.089***	-2.078	-1.324	-6.047***	-3.188***	-2.794***
Slovakia	-2.691	0.257	-2.156	-6.446***	-5.215***	-5.509***
Slovenia	-0.747	-3.425***	-3.980**	-3.802**	-3.874**	-6.827***
Spain	-2.006	-2.005	-2.028	-6.005***	-3.017	-3.355*
Sweden	-2.492	-4.123***	-2.155	-3.507*	-3.835**	-4.133**
United Kingdom	-3.560*	-2.109	-1.736	-5.007***	-6.071***	-2.533**

Note: first difference estimates do not include the constant term for a number of countries, namely Belgium (tax revenue), Cyprus (non-tax revenue and expenditure), Denmark (tax revenue), Ireland (non-tax and tax revenue), Latvia (tax revenue), Portugal (expenditure), Romania (tax revenue and expenditure), Finland (non-tax revenue), and United Kingdom (expenditure).

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