Obrzut, Robert

Article

Measuring the consistency of national accounts and balance of payments statistics

Eurostat Review on National Accounts and Macroeconomic Indicators (EURONA)

Provided in Cooperation with:
Eurostat, Luxembourg

Suggested Citation: Obrzut, Robert (2019) : Measuring the consistency of national accounts and balance of payments statistics, Eurostat Review on National Accounts and Macroeconomic Indicators (EURONA), ISSN 1977-978X, Publications Office of the European Union, Luxembourg, Iss. 1, pp. 79-101

This Version is available at:
https://hdl.handle.net/10419/309832

4 Measuring the consistency of national accounts and balance of payments statistics

ROBERT OBRZUT ([1])

Abstract: Since the adoption of new methodological standards for European national accounts and balance of payments (BoP) statistics in 2014, both statistical domains should be directly comparable and fully consistent. The latter implies that data elements that describe the same economic phenomena related to a specific point-in-time should be identical, and refrain from sending contradictory messages to the user. Hence, in applying both methodologies respectively, the *European system of accounts 2010 (ESA 2010)* and the *Balance of Payments and International Investment Position Manual — Sixth Edition (BPM6)*, a high degree of comparability and consistency between the account for the rest of the world (RoW) and the balance of payments is not only envisaged but should be manifested in quantitative measures of consistency.

Since the introduction ESA 2010 and BPM6 it has been essential for Eurostat to monitor whether data are indeed consistent, and where inconsistencies occur, ascertain which accounts were most concerned, which EU Member States were most concerned, and what actually caused the measured discrepancies. Over time, quantitative analyses and investigations have resulted in the identification of the underlying causes for inconsistencies between sector accounts and the balance of payments (Obrzut (2017)).

From 2019, both statistical domains will be undergoing fundamental revisions by national compilers (benchmark revisions): their endeavours for better quality and more comparable statistics shall be guided by the full implementation of the above mentioned consistency requirements. Therefore, conclusive quantitative measures should assist decision-makers, quality audits and external users in obtaining a good indication as to how effective these oncoming revision processes for the statistics of EU Member States will be in terms of leading to the full adoption of the requirements of the methodological standards.

In this article, concepts and approaches to measure consistency between national accounts and the balance of payments are presented, and consequently a scoreboard of indicators based on mean absolute percentage deviation measures is proposed to produce a rough, but conclusive view on the state of consistency among the statistics of EU Member States.

Keywords: balance of payments, sector accounts, international trade, data consistency

JEL codes: E01, F40

([1]) Eurostat, Unit C.5: Integrated global accounts and balance of payments.

1. Introduction

According to the *European system of accounts (ESA 2010)* and the *Balance of Payments and International Investment Position Manual — Sixth Edition (BPM6)* direct comparability and high consistency shall guide the compilation of national accounts and balance of payments (BoP) statistics ([2]). However, in earlier studies it has been shown that the methodological imperative of consistency is not entirely reflected by data evidence when analysing the statistics of EU Member States (for a more profound analysis, see Eurostat (2019b). It has been argued that different compilation practices and interpretations of the methodological standards, the use of different data sources and concepts inherent to particular sub-items in the accounts, as well as the application of different production and revision calendars do not allow a consequent comparison of vintages without observing differences. These arguments were met by the European Union's institutions' request for addressing organisational issues in the statistics of particular Member States more effectively when rigid interpretations of institutional autonomies by the involved counterparts prevail, and for cooperative strategies when compiling both statistics through task and/or data sharing ([3]).

In addition, it is emphasised that the guidelines of the harmonised European revision policy (HERP) for macroeconomic statistics in the EU suggest a high degree of coordination in revision practices. The oncoming benchmark revisions for both sets of statistics provide therefore a unique opportunity to rectify the situation in the EU Member States characterised by such discrepancies with the ultimate goal of directly comparable statistics. With these guiding principles in mind, the success of the oncoming benchmark revisions will depend greatly on whether increased consistency in both statistical domains is reflected by data evidence.

This article proposes a scoreboard of indicators in order to quantify developments over time in a comparable and communicable manner to external users. They complement available information from annual quality reports for monitoring purposes.

2. Developing consistency measures

2.1 Concepts and approaches to consistency

National accounts and BoP statistics are based on closed accounting frameworks, determined by vertical hierarchies of accounts that add up to aggregates. Elements are summarised from sub-totals to main aggregates, respecting implied rules of integrity and internal consistency (see Table 1).

([2]) BPM6 Appendix 7 and ESA 2010 Chapter 18.
([3]) The Committee on Monetary, Financial and Balance of Payments Statistics (CMFB) — a joint coordination body between the European statistical system and the European system of central banks — investigated the nature of inconsistencies and made proposals for addressing them, see CMFB (2017a) and CMFB (2018). It mandated Eurostat to focus on non-financial accounts, and the European central bank (ECB) to focus on financial accounts.

Table 1: Levels of aggregation in national accounts and the balance of payments

	Level of aggregation	Balance of payments (BoP) item	National accounts: rest of the world (RoW) sector item
1	Non-financial	Current and capital account	Net lending/net borrowing (non-financial) B9
	Financial	Financial account	Net lending/net borrowing (financial) B9F
2	Non-financial	Current account	Goods+Services+Primary income+Secondary income
		Capital account	Capital transfers D9+Net acquisitions of non-financial, non-produced assets NP
3	Current account	Goods	Exports of goods P61, Imports of goods P71
		Services	Exports of services P62, Imports of services P72
		Primary income	D1+D2+D3+D4
		Secondary income	D5+D6+D7+D8
4	Primary income	Compensation of employees D1	Compensation of employees D1
		Taxes on production and imports D2	Taxes on production and imports D2
		Subsidies D3	Subsidies D3
		Investment income D4	Property income D4
	Secondary income	Current taxes on income and wealth D5	Current taxes on income and wealth D5
		Social contributions and benefits D6	Social contributions and benefits D6
		Other current transfers D7	Other current transfers D7
		Adjustment for the change in pension entitlements D8	Adjustments for the change in pension entitlements D8
	Capital account	Capital transfers D9	Capital transfers D9
		Acquisitions less disposals of non-financial, non-produced assets NP	Net acquisitions of non-financial, non-produced assets NP
5	Secondary income	Net non-life insurance premiums D71	Net non-life insurance premiums D71
		Non-life insurance claims D72	Non-life insurance claims D72
		Current international cooperation D74	Current international cooperation D74
		Miscellaneous transfers D75	Miscellaneous transfers D75
		VAT- and GNI-based EU own resources D76	VAT- and GNI-based EU own resources D76

Note: BoP and RoW items according to BPM6 and ESA 2010

Due to its hierarchical nature, different levels of data aggregation can be identified, thus measures of consistency being attributed to each level of aggregation. As a general rule the higher the level of aggregation, the rougher and less specific the conclusion that can be obtained from such measures. The lower the level of aggregation, the more specific but also problematic these measures can become, due to different concepts applying to some specific components of the accounts (for example, ESA 2010 property income and BPM6 investment income; or the classification of financial instruments in ESA 2010 and the functional categories of the financial account in the BoP ([4])).

([4]) A different presentation of the same economic phenomena prevents a direct comparison of the financial account components; a more detailed discussion is presented in Obrzut (2016).

Depending on which level of aggregation the corresponding measures focus on, different concepts of consistency apply. While at the most aggregated level measures remain unspecific about the situation in the underlying components, they still might appear sufficient in order to gain a rough top-down view. However, consistency measured at the most aggregated level can be blurred by offsetting effects among the components ([5]) and therefore cannot be considered conclusive. On the other hand, conceptual differences in the statistics become apparent at lower aggregation levels, where comparison is problematic. In order to determine the ideal set of aggregation both aspects of concepts and approaches to consistency appear relevant. Measures that compare at the highest levels of aggregation (top-down approach) cannot disclose the dynamics in the underlying components, while measures that compare at the lowest possible levels of aggregation (bottom-up approach) trigger alerts due to different concepts applying to some sub-items, as well as overloading the analysis with statistical indicators. Consequently, we have decided not to pursue detailed measures for the financial account components in this article.

2.2 How best to measure consistency?

The statistical measures that have been applied by Eurostat to its consistency analyses so far tried to incorporate aspects of communicability, complexity and comparability, with a view to their interpretation by the user. In other words, the measures used are supposed to be easily understood, although comprehensive enough to cover the full picture, and comparable with each other.

In this article, we present a set of indicators (a scoreboard) that should measure consistency at different levels of aggregation, as is done in Eurostat's annual quality reports for ESA and BoP statistics. High comparability is secured from statistical measures that are built on the same principles over the entire accounting framework. For example, discrepancies should be equally valued at all levels of aggregation. This supports assessment according to the same criteria (thresholds). Ideally, the extent of deviation is not weighted with other factors (such as GDP or total/average transaction volumes/assets and liabilities, and so on) because such weights would bring additional aspects into the analysis that do not directly refer to the extent of discrepancies. For example, measures that set the extent of discrepancies in reference to GDP or total volumes of transactions, tell us only about the relative prominence of these discrepancies from a Member State's point of view. However, for an overall assessment (across Member States), the absolute extent of these discrepancies appears more relevant. Indicators related to GDP or total transaction volumes ([6]) would consequently downplay inconsistencies occurring for economies with higher GDP/transactions volumes and overstate them for economies with lower GDP/transaction volumes, without regard to the absolute extent of deviations for these national statistics.

For a meaningful comparison we have to define the base and reference value. For the purposes of this analysis, we have chosen the value from BoP statistics as a base value and the comparable (mirror) value from the rest of the world (RoW) sector account as a reference value (without perceiving it as a benchmark to the BoP value). In other words, we measure how the BoP value deviates from the RoW value without drawing any conclusions on the qualitative status of either statistic.

([5]) Positive and negative differences compensate each other when being summed up to a total.
([6]) Total transaction volumes are calculated as the sum of credit/exports and debit/imports transactions.

The (nominal) difference between the BoP and RoW values can have a positive or negative sign, and indicates whether the base value appears over- or underestimated in regard to the reference value. However, it is problematic to add up these differences to totals, as offsetting effects hamper further interpretation ([7]).

(2.2.1) $Diff_{nom} = BoP - RoW$

In order to avoid such problems, absolute measures appear more appropriate for analytical purposes. Absolute measures can be summed up across Member States, for example, when wishing to make an analysis of total discrepancies for a particular geographical profile; this allows us to identify major contributors and structural issues.

(2.2.2) $Diff_{abs} = \left|BoP - RoW\right|$

The profile is blurred by the prominence of (particular) economic activities in some Member States. For example, large open economies with high transaction volumes in cross-border trade would appear more exposed to inconsistencies than smaller economies (even though the extent of discrepancies for the former could be relatively small compared with the total size of its economy). Consequently, as a possible way forward, relative measures related to external weights (for example, GDP or total transaction volumes) could help assess the prominence of a Member State's exposure with regard to its overall economic activities. However, as mentioned earlier they would not serve our purposes for a scoreboard presentation, as additional aspects are implicitly imported into the analysis that have no causal relationship with the incurred discrepancies (such as the size of the economy or the prominence of particular economic activities).

(2.2.3) $Diff_{rel} = \frac{\left|BoP - RoW\right|}{GDP}100 \text{ or } \frac{\left|BoP - RoW\right|}{total\ transactions}100$

When comparing discrepancies over longer time spans, percentage error (or percentage deviation) measures based on multiannual averages could be applied (for an overview, see Hyndman, R.J. and G. Athanasopoulos (2018)). The mean absolute percentage deviation or error (MAPD or MAPE) is commonly used to predict the accuracy of forecasting methods; the only difference between the two is the choice of scale.

(2.2.4) $Diff_{MAPD} = \frac{1}{n}\sum\frac{\left|BoP - RoW\right|}{\left|RoW\right|}$, $Diff_{MAPE} = \frac{1}{n}\sum\frac{\left|BoP - RoW\right|}{\left|RoW\right|}100$

The results are also useful insofar as this analysis of multiannual comparisons of discrepancies is easy to explain and does not depend on other weights. On the other hand, the interpretation of the chosen base and reference values is different. While in forecasting the reference value is an explicit benchmark for the base value to be approximated, in the context of consistency analysis there is no clear benchmark, as reconciliation should be initiated from either one or the other side or even both sides, depending on the specific situation in each Member State. The calculation of the MAPD/MAPE involves only base and reference values (and their differences). Thus, the absolute difference is related to the base value and produces a normalised measure that can easily be applied across different Member States, accounts categories and time spans (n = number of years). In the context below, for presentational

([7]) The formulae below have been simplified in order to make the measures more intuitive.

purposes we apply the MAPD to balances and the MAPE to gross transactions. Due to their nature, balances appear more volatile over time, can change signs more often and could oscillate around or close to zero. Particularly the latter poses a mathematical problem, with particularly high values for reference values close to zero. The MAPD/MAPE therefore appears suitable to explain the situation at higher levels of aggregation roughly, although it bears the risk of a mathematical bias.

The advantage of using percentage error measures — as regards the criteria of a scoreboard presentation — is that they exclude in their original form any other weights that have no causal relationship to the measured discrepancy, and they can be applied to data over a longer time span. Full (or almost full) consistency is indicated when at (or close to) zero, while very high discrepancies apply when above 1.0 (100 %). Due to their nature, these measures appear most appropriate for analysing discrepancies in gross transactions. For the analysis of net figures or balances, the values could however trigger outliers (as mentioned above) that require further investigation/explanation.

For the sake of completeness, it should be added that the variety of possible statistical measures is not limited to the measures presented above ([8]), but in our view increasing the complexity of the chosen measures would interfere with the message being communicated to users.

3. Indicating inconsistencies in the non-financial and financial accounts

The data considered in this article refer to the situation as of January 2019 ([9]). For that production cycle, quarterly data up to the third quarter of 2018 had been transmitted to Eurostat by EU Member States and data sets effectively incorporated the results of the annual revision cycles in 2018. The analyses below cover data for the time span from 2015 to 2017. The choice of a three-year period resembles, in our view, the practices of many BoP compilers who review data for the previous two or three years during their annual routines for revisions. Longer time spans would consequently contain revision effects, shorter time spans (for example, just the current production year) would include some open coordination issues during the ongoing quarterly production cycles, but exclude more consistent data in earlier time periods, where coordination and revision efforts have resulted in improvements to consistency. Quarterly data were annualised and multiannual means were calculated for presentation purposes. Finally, the selected data can be expected to reflect a high degree of consistency, as they have been revised at earlier instances.

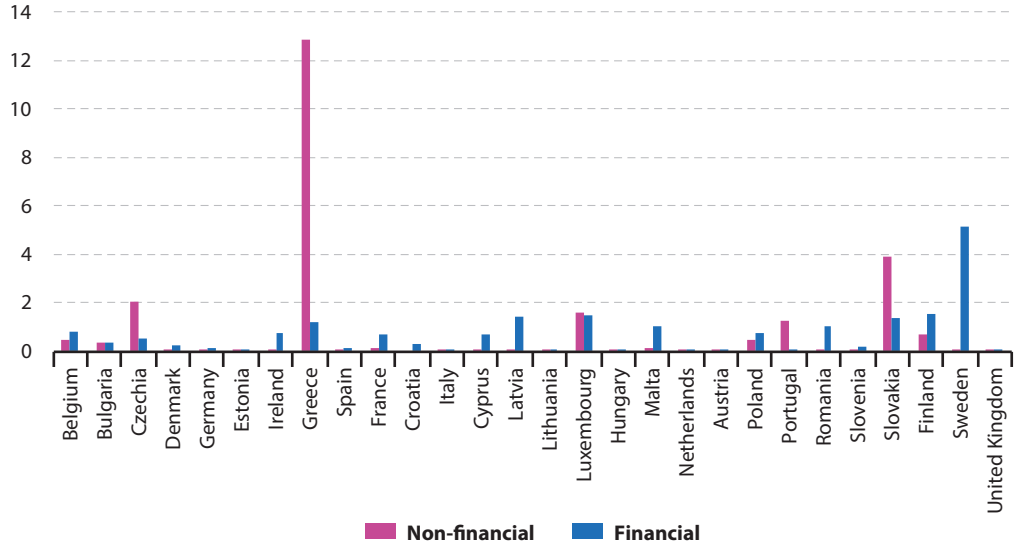
([8]) Alternatives include variance-based measures (root mean square error) or directional indicators; see Damia V. and C. Picon Aguilar (2006) and Eurostat Quality Report (2018).

([9]) Data for the April 2019 production cycle published for the first time annual figures for 2018. As the April 2019 data contained gaps, coordination issues in some country statistics and a vintage bias in the financial accounts, the January vintage appears more conclusive for the purpose of illustration in this article.

3.1 Level 1 — a top-down view of the accounts

At the most aggregated level (level 1 in Table 1) the balance of the BoP current and capital account is compared with the balancing item (B9) of the RoW sector account. Conceptually, both should represent the balance of the respective non-financial account and their values should be equal. For the purpose of the analyses presented, we define high consistency as prevailing where the chosen measures reach MAPD values between 0.0 and 0.1, moderate inconsistencies occur with values between 0.2 and 1.0, and high inconsistencies for values above 1.0; this categorisation is subject to interpretation and cannot be generalised. In the debate about what is considered an 'acceptable' discrepancy, views differ substantially, depending on the context.

Figure 1: Mean absolute percentage deviation for consistency indicators level 1, 2015-2017



Note: the mean absolute percentage deviation (MAPD) is calculated as the multiannual mean deviation of the BoP value (balance of current and capital account) from the RoW value (balance of net lending/net borrowing (B9). Croatia: non-financial net lending/net borrowing not available.

Source: Eurostat

While there were often larger percentage deviations for the non-financial account, deviations were more common for the financial account in all of the EU Member States. In other words, discrepancies in the non-financial accounts appear in a Member States-specific context, while discrepancies in the financial accounts occur more broadly across Member States. As these measures concern multiannual data (2015-2017), the deviations could either come from earlier and/or recent periods. The high percentage deviation for Greece in its non-financial accounts for example, results from 2017 data. For Slovakia, the high values come on the other hand from earlier periods. To determine where these deviations come from a further analysis of lower aggregation levels is necessary.

On the positive side, 18 EU Member States showed high consistency between values for non-financial accounts and 11 for their financial accounts. There was a sizeable number of Member States with moderate inconsistencies for their financial accounts, while the situation for non-financial accounts was more polarised (either large differences or very small differences).

The criticism of these results is implicit in the construction of the measures. The deviation measures are applied on balances data. It is in the nature of balances that they can be volatile without raising doubts on plausibility. Level 1 measures therefore cannot stand alone as a conclusive analysis.

3.2 Level 2 — a bird's-eye view of the non-financial account

As a full statistical comparison of the financial account components is difficult in practice due to the different concepts applying to both sets of statistics, level 2 indicators can only feasibly be analysed for non-financial accounts. For financial account components such as debt securities, deposits and loans, it is not feasible to make a direct mapping between the BoP and national accounts, thus invalidating the usefulness of MAPD/MAPE indicators in this context, or rendering these measures inconclusive; for a more detailed discussion, see Obrzut (2016).

Due to presentation differences between the current and the capital accounts, percentage deviations are calculated from gross transactions of the current account (MAPE) and balances of the capital account (MAPD). A mixed presentation appears justified as both measures are constructed on the same principles.

Percentage deviations (MAPE) for gross transactions in the current account appeared to be relatively minor due to the (still) high degree of aggregation. Debit transactions (imports/payments) of Greece and Luxembourg and credit transactions (exports/receipts) of France, Bulgaria and Slovakia were slightly more affected. Although the capital account proved not to be the main contributor to such discrepancies (Obrzut (2017)), relatively high percentage deviations were observed in Slovakia, Germany and France. Recent reports (Eurostat (2019b)) have also confirmed that these three EU Member States show particularly contradictory balances in their capital accounts.

3.3 Level 3 — component analysis of the current account

At this level of aggregation (level 3), the components of the current account can be more rigorously identified providing an opportunity to analyse possible effects on the overall picture of inconsistencies. An analysis of the component accounts proves useful, as it allows remaining structural or coordination issues in component-specific compilation processes to be identified. In general, percentage deviations in primary and secondary income were more prominent than deviations for goods and services, although in absolute terms services had the largest differences (Eurostat (2019b)). For goods, primary income and secondary income larger deviations were observed for credits (exports/receipts), whereas the largest deviations for services were for debits (imports/payments).

The discrepancies at higher levels of aggregation can be traced down to particular components of the current account. The analysis that follows also shows that while overall current account exposure to discrepancies at level 2 was minor (due to offsetting effects), differences for the individual components were more apparent. As an example, we look again at level 1 discrepancies for Greece and Slovakia in the non-financial accounts. At levels 2 and 3, the deviations observed may be closely linked to services imports and primary income payments for Greece, and secondary income and the capital account for Slovakia.

Figure 2a: Mean absolute percentage error for consistency indicators level 2, current account, 2015-2017

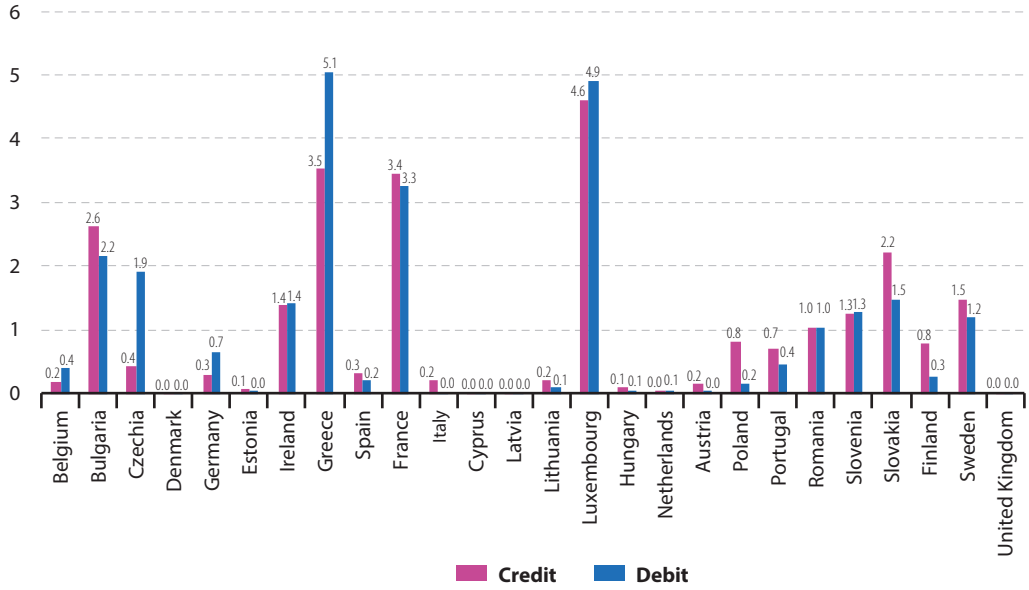
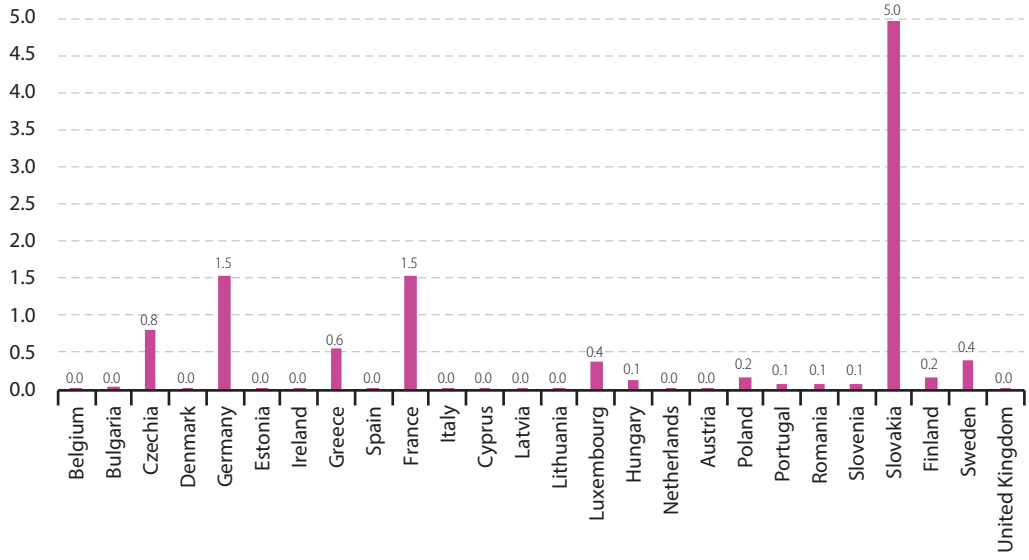


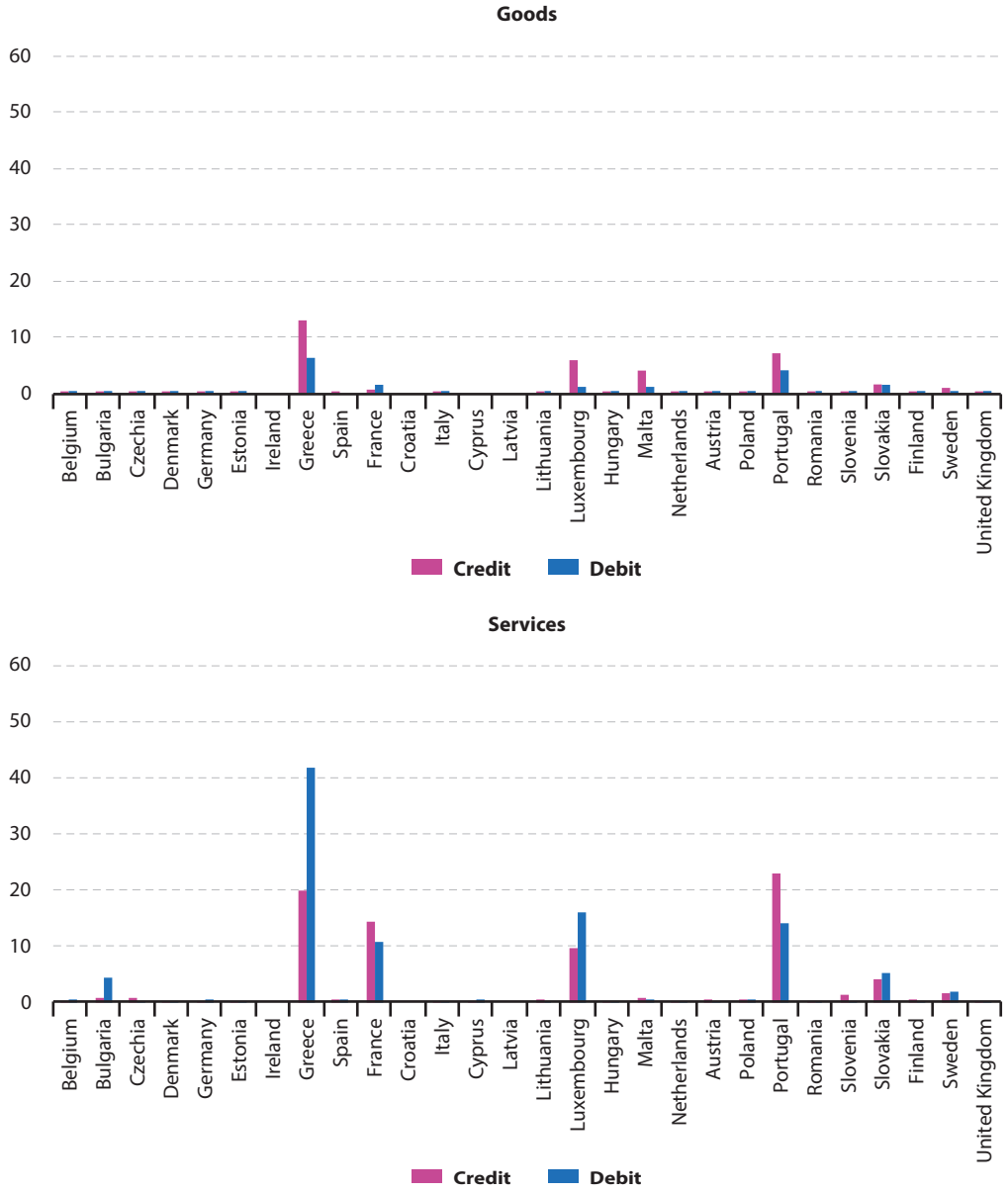
Figure 2b: Mean absolute percentage deviation for consistency indicators level 2, capital account, 2015-2017



Note: the mean absolute percentage deviation (MAPD) is calculated as the multiannual mean deviation of the BoP value (balance of current account; credits and debits) from the RoW value (balance; RoW payable and RoW receivable). The mean absolute percentage error (MAPE) is calculated as the multiannual mean percentage deviation of the BoP value (balance of the capital account) from the RoW value (balance of capital transfers (D9) and RoW acquisitions less disposals of non-financial non-produced assets (NP)). Croatia: not available. Malta: not publishable.

Source: Eurostat

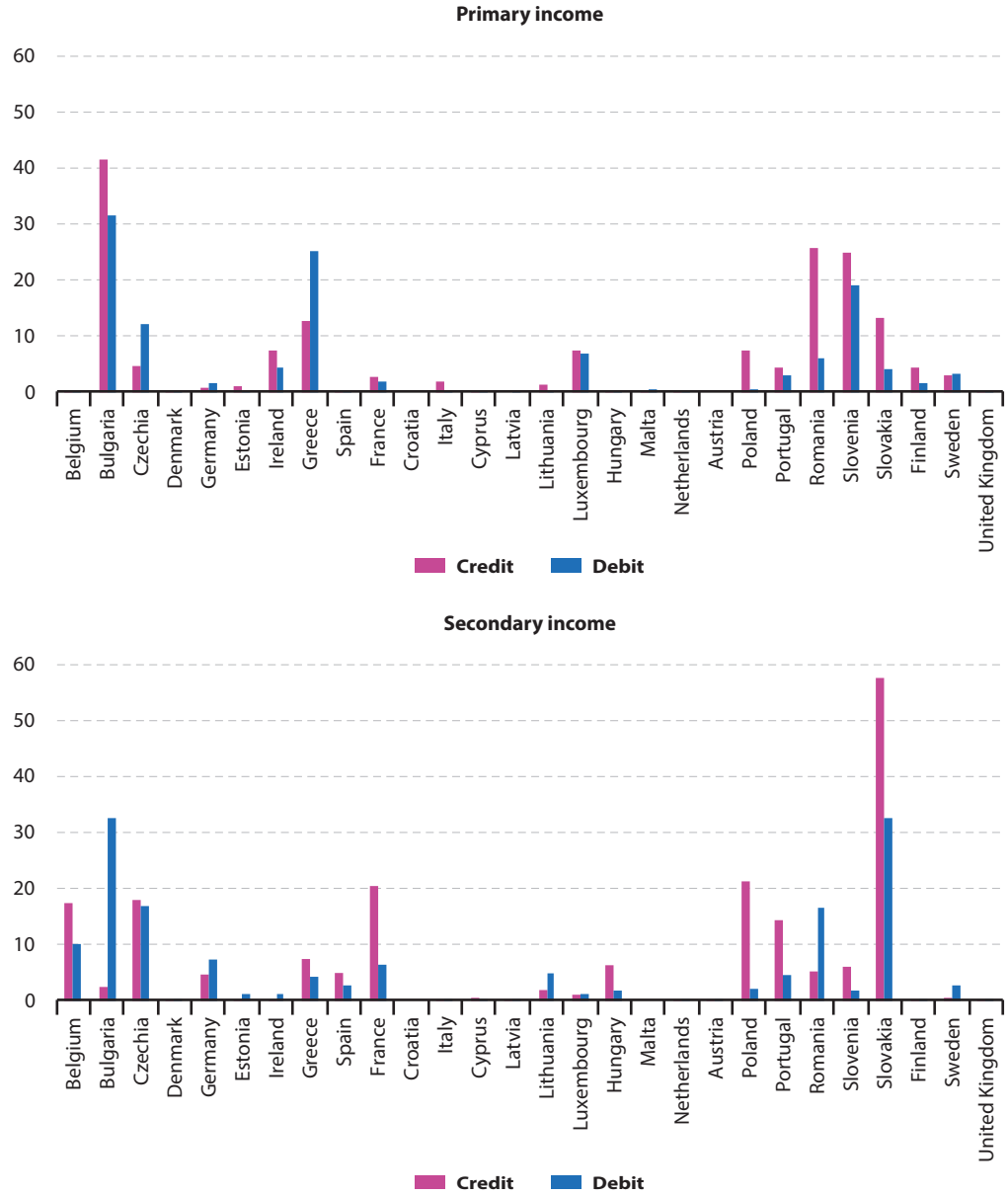
Figure 3: Mean absolute percentage error for consistency indicators level 3, main components of the current account, 2015-2017



Note: mean absolute percentage error (MAPE) is calculated as the multiannual mean percentage deviation of the BoP value from the RoW value for credits (exports/receipts) and for debits (imports/payments). Croatia: not available.

Source: Eurostat

Figure 3 (continued): Mean absolute percentage error for consistency indicators level 3, main components of the current account, 2015-2017



Note: mean absolute percentage error (MAPE) is calculated as the multiannual mean percentage deviation of the BoP value from the RoW value for credits (exports/receipts) and for debits (imports/payments). Croatia: not available. Malta: secondary income, not publishable.

Source: Eurostat

The indicators presented and their levels of aggregation are shown in the context of Member State-specific analyses on consistency. They cannot completely replace direct measures of (absolute) differences, but complement them for a broader picture. This analysis makes it possible to identify the most affected elements of the accounts, in order to eliminate possible sources for inconsistencies and locate areas where higher coordination efforts would appear to be desirable.

3.4 Levels 4 and 5 — sub-item analysis of the primary and secondary income accounts

At the lowest levels of aggregation, sub-items can be conclusively compared, while they also face restrictions in their presentations. More detailed data are generally challenged by confidentiality issues, although in some EU Member States more than in others. As such, conclusions are hampered not by the level of aggregation, but by the unavailability of comparable data for one or other of the statistical sources. Furthermore, the primary income sub-item of investment income/property income (D4) faces presentational differences, which do not support conclusive comparisons (see Annex). Sub-items for level 5 reflect the elements of secondary income; however, for the purposes of this article we refrain from a detailed presentation.

3.5 Scoreboard presentation

Summarising all of the above mentioned measures into one intuitive presentation could promote the identification of statistics for those EU Member States with considerable discrepancies in their data sets, highlighting areas that were most affected within the component accounts. This would enable analysts to draw a causal path from the (inconclusive) top-down perspective to the lower levels of aggregation. The values in Table 2 summarise — for each Member State —measures calculated with regard to each level of aggregation. The Member States with complete rows marked in a pink shade have a noticeable exposure to inconsistencies at all levels and thus illustrate the path of inconsistencies through the (vertical) data hierarchies; Member States without shaded areas are characterised by relatively consistent data across all levels of presentation. The ensuing analysis of possible causes to inconsistencies in a Member State-specific context (Obrzut (2017)), as well as international recommendations for improving convergence between the two statistical sources, should guide the revision process (CMFB (2017b) and CMFB (2018)).

Eight EU Member States had no (or low) inconsistencies in their statistics — Estonia, Spain, Italy, Lithuania, Hungary, the Netherlands, Austria and United Kingdom (some for only one of the specific levels of aggregation); for these, the presentation of BoP data did not significantly deviate from the presentation of data for RoW sector accounts. An additional four Member States had inconsistencies that were principally recorded for their financial accounts, with no lack of consistency for their non-financial accounts — Denmark, Cyprus, Latvia and Ireland ([10]). Greece had the greatest deviations across many of the components, including relatively high percentage deviations for goods, services, primary income, the capital and financial account.

([10]) Ireland had consistent non-financial accounts, but was subject to a coordination issue, especially for primary income; see its slightly elevated MAPE measure for this component.

Table 2: Scoreboard of consistency indicators, 2015-2017

	Level 1		Level 2		
	Non-financial	Financial	Current account credit	Current account debit	Capital account
	MAPD	MAPD	MAPE	MAPE	MAPD
Belgium	0.5	0.8	0.2	0.4	0.0
Bulgaria	0.4	0.4	2.6	2.2	0.0
Czechia	2.1	0.5	0.4	1.9	0.8
Denmark	0.0	0.2	0.0	0.0	0.0
Germany	0.0	0.2	0.3	0.7	1.5
Estonia	0.0	0.0	0.1	0.0	0.0
Ireland	0.0	0.7	1.4	1.4	0.0
Greece	12.9	1.2	3.5	5.1	0.6
Spain	0.0	0.1	0.3	0.2	0.0
France	0.1	0.7	3.4	3.3	1.5
Croatia	:	0.3	:	:	:
Italy	0.0	0.1	0.2	0.0	0.0
Cyprus	0.0	0.7	0.0	0.0	0.0
Latvia	0.0	1.4	0.0	0.0	0.0
Lithuania	0.1	0.0	0.2	0.1	0.0
Luxembourg	1.6	1.5	4.6	4.9	0.4
Hungary	0.0	0.0	0.1	0.1	0.1
Malta	0.1	1.1	:	:	:
Netherlands	0.0	0.0	0.0	0.1	0.0
Austria	0.1	0.0	0.2	0.0	0.0
Poland	0.5	0.8	0.8	0.2	0.2
Portugal	1.3	0.1	0.7	0.4	0.1
Romania	0.1	1.0	1.0	1.0	0.1
Slovenia	0.0	0.2	1.3	1.3	0.1
Slovakia	3.9	1.4	2.2	1.5	5.0
Finland	0.7	1.5	0.8	0.3	0.2
Sweden	0.1	5.2	1.5	1.2	0.4
United Kingdom	0.0	0.0	0.0	0.0	0.0

Note: values marked with a pink shade indicate a moderate to high level of inconsistencies with MAPD >0.1 or MAPE >10 %.

Source: Eurostat

Table 2 (continued): Scoreboard of consistency indicators, 2015-2017

	Level 3							
	Goods credit	Goods debit	Services credit	Services debit	Primary income credit	Primary income debit	Secondary income credit	Secondary income debit
	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE
Belgium	0.2	0.0	0.3	0.5	0.0	0.0	17.5	9.0
Bulgaria	0.0	0.0	0.9	4.4	41.6	31.5	2.5	29.4
Czechia	0.2	0.1	0.9	0.0	4.8	12.3	17.9	15.3
Denmark	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Germany	0.0	0.1	0.1	0.6	0.8	1.8	4.8	6.7
Estonia	0.0	0.0	0.0	0.0	1.2	0.1	0.1	1.1
Ireland	0.0	0.0	0.0	0.0	7.6	4.4	0.0	1.2
Greece	13.1	5.2	19.9	41.7	12.8	25.1	7.4	3.8
Spain	0.0	0.0	0.6	0.5	0.0	0.1	4.9	2.5
France	0.6	1.2	14.4	10.7	2.6	1.9	20.5	5.9
Croatia	:	:	:	:	:	:	:	:
Italy	0.0	0.0	0.2	0.0	1.8	0.2	0.3	0.1
Cyprus	0.0	0.0	0.0	0.7	0.0	0.2	0.6	0.2
Latvia	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1
Lithuania	0.0	0.0	0.5	0.0	1.3	0.0	1.9	4.5
Luxembourg	5.8	1.0	9.7	16.1	7.6	7.0	1.1	1.0
Hungary	0.0	0.0	0.2	0.0	0.3	0.0	6.4	1.8
Malta	4.2	1.0	0.9	0.4	0.0	0.6	:	:
Netherlands	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0
Austria	0.0	0.0	0.6	0.1	0.0	0.0	0.0	0.0
Poland	0.1	0.0	0.5	0.4	7.4	0.6	21.2	2.0
Portugal	7.0	3.6	23.1	14.0	4.6	3.0	14.4	4.2
Romania	0.0	0.0	0.0	0.0	25.8	6.0	5.2	15.0
Slovenia	0.0	0.0	1.4	0.1	25.0	19.2	6.2	1.8
Slovakia	1.7	1.2	4.3	5.2	13.2	4.1	57.5	29.4
Finland	0.1	0.1	0.4	0.0	4.4	1.5	0.4	0.2
Sweden	1.0	0.5	1.6	2.0	3.0	3.3	0.6	2.4
United Kingdom	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: values marked with a pink shade indicate a moderate to high level of inconsistencies with MAPD >0.1 or MAPE >10 %.

Source: Eurostat

Table 2 (continued): Scoreboard of consistency indicators, 2015-2017

	Level 4									
	Compensation of employees credit	Compensation of employees debit	Taxes on production and imports debit	Subsidies credit	Current taxes on income and wealth credit	Current taxes on income and wealth debit	Social contributions and benefits credit	Social contributions and benefits debit	Capital transfers credit	Capital transfers debit
	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE
Belgium	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	1.0	0.2
Bulgaria	0.1	0.4	:	:	0.0	20.8	0.0	85.0	2.1	8.0
Czechia	0.6	4.2	19.4	5.0	1.8	0.7	4.3	0.1	32.4	96.8
Denmark	0.1	0.0	0.1	0.0	0.0	0.7	0.1	0.1	:	:
Germany	6.0	16.2	9.1	3.7	1.8	13.4	12.2	6.0	11.9	46.8
Estonia	0.1	0.7	5.4	8.8	2.9	0.7	0.5	0.2	0.2	7.2
Ireland	0.3	0.0	22.4	0.0	0.0	0.0	0.7	0.0	0.0	:
Greece	55.3	265.8	76.8	15.4	:	:	:	:	51.6	18.6
Spain	0.0	0.0	:	:	:	100.0	:	100.0	:	:
France	0.7	1.8	10.4	5.0	4.0	:	2.5	2.0	10.9	39.8
Croatia	:	:	:	:	:	:	:	:	:	:
Italy	0.0	0.0	1.3	0.4	0.0	0.0	0.0	1.1	0.1	0.0
Cyprus	0.0	0.0	2.5	3.9	:	0.0	16.7	75.0	0.9	:
Latvia	0.0	0.0	1.9	0.0	0.0	:	0.7	0.0	0.0	0.0
Lithuania	0.7	0.4	0.5	0.1	4.3	1.9	1.1	2.0	0.1	9.6
Luxembourg	:	:	:	:	:	:	:	:	:	:
Hungary	0.0	0.1	1.4	2.5	1.4	0.0	0.1	0.0	9.7	32.9
Malta	3.7	0.7	229.2	11.5	:	:	:	:	:	:
Netherlands	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.3	0.0	0.0
Austria	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0.1	0.1
Poland	0.0	0.0	22.9	19.0	0.1	0.1	0.2	0.0	20.9	100.0
Portugal	0.0	0.0	:	:	100.0	100.0	:	100.0	4.8	40.6
Romania	53.0	45.2	31.0	0.5	:	5.1	91.3	98.4	7.9	:
Slovenia	0.2	0.4	577.9	9.5	91.9	2.3	2.7	1.9	0.8	3.5
Slovakia	5.3	6.9	4.8	72.2	100.0	100.0	100.0	100.0	148.4	63.2
Finland	0.2	0.1	5.1	0.0	:	:	1.0	0.3	0.7	316.7
Sweden	1.4	24.9	0.1	3.8	2.6	0.3	47.0	0.3	16.1	94.1
United Kingdom	0.0	0.0	:	:	0.1	0.0	2.7	0.0	0.1	0.0

Note: values marked with a pink shade indicate a moderate to high level of inconsistencies with MAPD >0.1 or MAPE >10 %.

Source: Eurostat

Table 2 (continued): Scoreboard of consistency indicators, 2015-2017

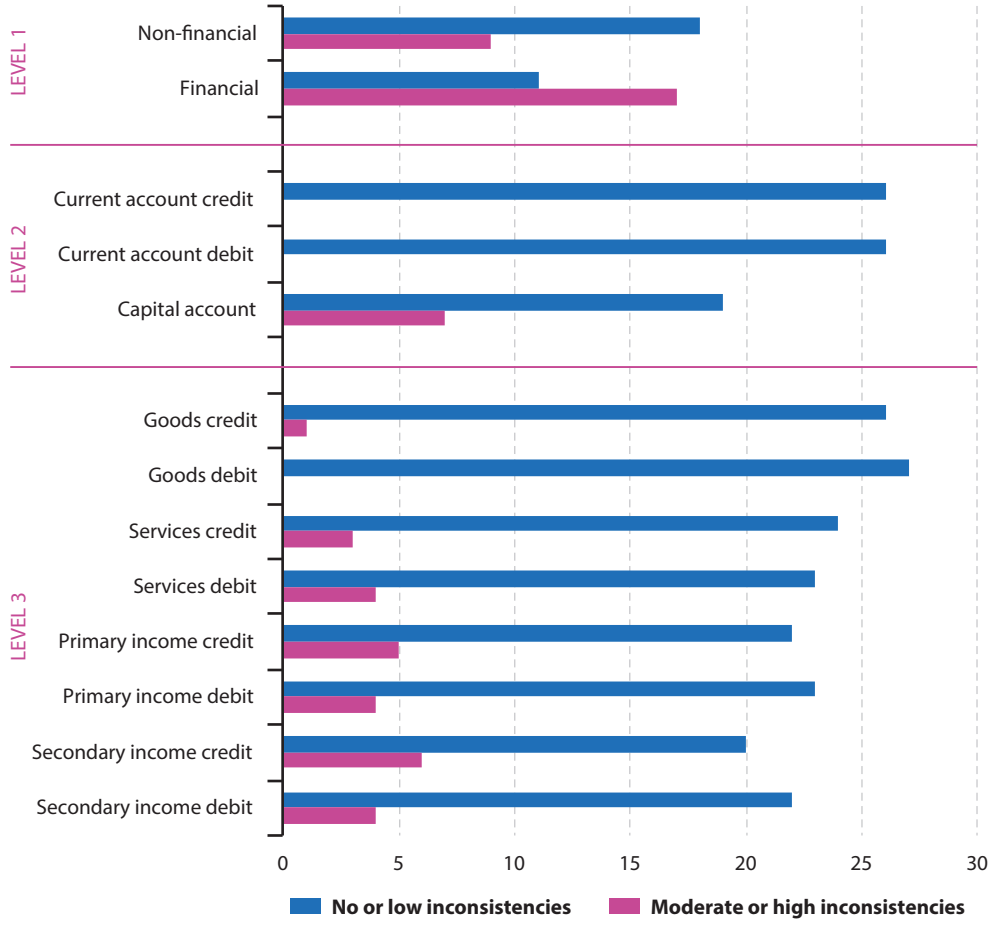
	Level 5							
	Net non-life insurance premium credit	Net non-life insurance premium debit	Non-life insurance claims credit	Non-life insurance claims debit	Current international cooperation credit	Current international cooperation debit	Miscellaneous current transfers credit	Miscellaneous current transfers credit
	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE	MAPE
Belgium	:	:	:	:	:	:	:	:
Bulgaria	:	:	:	:	489.9	100.0	:	183.2
Czechia	5.8	100.0	100.0	3.5	188.9	25.3	21.6	7.8
Denmark	0.2	0.1	0.1	0.1	14.2	2.4	6.6	5.1
Germany	8.5	10.0	11.8	8.4	:	:	:	:
Estonia	28.9	1.2	2.9	4.2	0.2	0.9	0.3	0.7
Ireland	0.0	:	:	0.0	100.0	100.0	37.0	27.6
Greece	:	:	:	:	100.0	100.0	118.2	268.0
Spain	:	:	:	:	:	:	:	:
France	76.6	38.2	197.3	89.2	6.2	3.9	8.5	4.7
Croatia	:	:	:	:	:	:	:	:
Italy	0.0	0.0	1.1	0.0	0.0	0.1	0.4	0.0
Cyprus	:	:	:	:	0.0	0.0	:	:
Latvia	0.0	0.0	0.0	0.0	20.4	0.0	3.1	0.5
Lithuania	80.8	88.8	88.7	91.5	0.3	14.6	0.1	0.1
Luxembourg	:	:	:	:	:	:	:	:
Hungary	7.1	2.0	6.4	0.5	100.0	100.0	44.7	96.1
Malta	:	:	:	:	100.0	100.0	:	:
Netherlands	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Austria	:	:	:	:	0.0	0.3	:	:
Poland	1.2	0.1	0.1	1.2	:	:	:	:
Portugal	:	:	:	:	:	:	:	:
Romania	:	:	0.2	0.5	468.3	27.8	:	:
Slovenia	6.6	196.4	97.0	60.9	0.7	100.0	7.9	4.9
Slovakia	100.0	:	:	100.0	:	:	:	:
Finland	2.0	0.5	0.5	2.0	0.3	0.0	0.3	2.5
Sweden	0.0	0.1	0.1	0.0	32.5	102.0	8.0	9.8
United Kingdom	0.0	233.4	0.0	:	:	:	3.6	340.4

Note: values marked with a pink shade indicate a moderate to high level of inconsistencies with MAPD >0.1 or MAPE >10 %.

Source: Eurostat

To conclude, a majority of the EU Member States met the (expected) standards in relation to their non-financial accounts (18 Member States had no or low inconsistencies), while 11 Member States recorded a satisfactory situation with respect to their financial accounts. The vast majority (19 Member States) also reported consistent data for the capital account, while high percentage deviations were nevertheless still encountered for some Member States. While percentage deviations appeared relatively small for the current account at level 2, the component analysis (for level 3) revealed that for some Member States this was due to offsetting effects for the aggregate measures as there were large deviations at the lower level. While large deviations for goods were only apparent for one Member State (Greece), the other level 3 components witnessed between three and six Member States with large deviations (see Figure 4).

Figure 4: Scoreboard — extent of consistency between BoP and RoW sources, 2015-2017
(count of EU Member States)



Note: Croatia, data for RoW, not available.
Source: Eurostat

3.6 Benchmarks in the assessment of consistency

The above presentation has applied implicit thresholds in order to classify whether data consistency has been achieved or not, and, if not, at what level of aggregation alerts have been signalled. This is useful information to complement compilers' ambitions for reconciliation. At the same time, the choice of threshold determines the number of 'performers' and sends signals to compilers. If thresholds were set too restrictively, then there might be an unrealistic number of signals — either too many or too few. For this analysis a threshold was set such that MAPD/(MAPE) values in the range of 0.0-0.1 (0-10 %) were associated with no or low levels of inconsistencies. If the thresholds had instead been set with a strict interpretation of MAPD = 0.0/MAPE = 0 % then only the United Kingdom would be classified as a 'performer', in a position to provide consistent data. Alternatively, if the threshold had been set at 0.5 (50 %) then the number of 'performers' for the current account would have included all of the EU Member States except Slovakia for secondary income credits, while it would also have included all but five Member States for the capital account. At the threshold of 1.0 (100 %), the number of 'performers' would have increased further still.

In practice there are no clear recommendations for thresholds, and if they are made, they are usually contingent to the purpose of the assessment and the underlying data to be analysed. In the context of BoP and RoW sector statistics, data compilers face several factors that influence the extent of deviations in their statistical products (Obrzut (2016) and Obrzut (2017)), such as the organisational and institutional framework under which compilation processes are operating, the extent of data sharing/shared use of data sources among different compiling institutions, the level of systematic coordination of the data production processes, the national production and revision calendars, and/or the aforementioned presentational differences in statistical frameworks.

In the light of evidence provided by the EU Member States, setting a threshold at zero discrepancies would appear to be an unrealistic objective ([11]). The margin of 0.1/10 % in the above context is assumed to accommodate 'reasonable' deviations based on vintage effects or occasional coordination issues. It remains also at the discretion of the analyst to envisage assessment from the first three levels of aggregations, where underlying data availability appears more satisfying, or include all five presented levels (although with some caveats on confidentiality and possible conceptual differences in some sub-items). Under any circumstances the scoreboard can alert for inconsistent presentations in the accounts of Member State's statistics, and gauge the effectiveness of the processes used for major revisions.

([11]) Only fully integrated compilation systems could envisage such an ambitions objective.

4. Benchmark revisions of BoP and national accounts statistics for the EU Member States

4.1 Why benchmark revisions?

Benchmark revisions are instrumental for high-quality statistics as they incorporate views and information that has become available to the compiler after the regular publication cycles. Under these circumstances, new data sources and methods are incorporated effectively into the statistics. Due to their nature, benchmark revisions complement regular routine revisions and are therefore less frequent. As a general rule they occur every 5-10 years in practice (Eurostat (2019a)) and include revisions of back data over a longer time span. However, it remains at the discretion of individual EU Member States to determine their revision frequencies and the most appropriate reference year based on the data sources available to them. In the context of EU statistics, such reoccurring revision events should be conducted in a coordinated manner in order to produce comparable time series across all Member States.

4.2 Harmonised benchmark revisions for the EU-28 and their expected outcomes

The last major revision of data for the EU Member States occurred in 2014 with the introduction of the new methodological standards for national accounts (ESA 2010) and the balance of payments (BPM6). Such major (recurring) events in European macroeconomic statistics are scheduled for 2019 and 2024 (CMFB (2017b)); they should take place in accordance with agreed harmonised revision guidelines — the harmonised European revision policy (HERP). According to the indicative planning available at the time of writing, a majority of the EU Member States will have conducted such revisions by 2019 or 2020 for their national accounts. Due to the imposed requirement for consistency, this also implies a reconciliation between national accounts and BoP statistics. To arrive at simultaneously published national accounts and BoP data, the compilers of both domains are expected to coordinate their work processes and exchange estimates in good time, in order to support the publication of comparable statistics (Eurostat (2019a)). With increased coordination of the statistical production and revision processes, improvements may be expected in relation to the degree of consistency between national accounts and BoP statistics. In practice, this implies that the earlier causes for discrepancies identified by Eurostat should be addressed under the following assumptions:

- it should not make a difference whether national accounts and BoP statistics are produced in the same institution, or not;
- data sources and estimation practices should be reconciled in order to produce the same results for comparable statistical products;
- statistical production and data revisions should occur in a coordinated manner without permitting revision and vintage effects for any ensuing data comparisons;
- conceptual differences for specific sub-items should be agreed among compiling institutions for the sake of comparable statistics.

Conclusions

In 2019 and 2020, the compilation of national accounts and BoP statistics within the EU will undergo widespread benchmark revisions. These revisions are expected to trigger a higher degree of convergence between the two sources of statistics in line with international recommendations, as laid out in BPM6 and ESA 2010. Since the implementation of these standards in 2014, evidence from the data for individual EU Member States has shown that the consistency requirement does not necessarily apply to all Member States. While a few Member States produce fully comparable statistics, measured inconsistencies continue to be recorded for a few others. The overall extent of such inconsistencies has been constantly decreasing (Eurostat (2019b)), reducing the discrepancies recorded for the remaining Member States to predominantly 'structural' causes. Oncoming benchmark revisions provide an opportunity to rectify the situation, particularly in the affected Member States in order to emphasise the integrated concept of macroeconomic statistics ([12]). Without quantitative evidence, the course of improvements can however not be observed. Consequently, we presented a scoreboard of indicators to survey developments over time in a comparable and communicable manner to external users. The scoreboard complements available information from annual quality reports (Eurostat (2018)) for monitoring purposes.

These indicators focus only on the extent of differences between the two statistical sources and refrain from incorporating other aspects into the presented measures (that are not causally related to the measured discrepancies). Three levels of data aggregations were identified where comparisons appear meaningful. At the most aggregated level (level 1) a rough picture can be obtained whether the two statistical sources correspond to each other and whether discrepancies are of a financial or non-financial nature. At level 2, the situation can be assessed for the current and capital account, although no detailed conclusions appear possible due to the underlying risk of offsetting effects for discrepancies across the component data. The component analysis (level 3) can produce conclusive results which help to identify specific issues in the (non-financial) accounts.

But why not go further than level 3? At the lower aggregation levels different concepts (for example, primary income, financial account components) become more relevant, although there are also flagging policies maintained by data compilers that impede drawing comprehensive conclusions. The scoreboard of indicators has therefore been designed to alert users when relatively high percentage deviations occur between data from the BoP and those from the RoW sector. Equally, there is no causal relationship imposed in this assumption whether BoP or RoW data should serve as a benchmark. Most reasonably, an exchange of practices — as suggested by international guidelines — will lead to the adoption of new standards and policies for both statistics.

([12]) According to a recent Eurostat questionnaire (May 2019), at least 22 EU Member States regard full consistency between BoP and the RoW sector accounts as being achievable during 2019/2020.

References

Eurostat (2013), *European system of accounts (ESA 2010)*, Eurostat, Luxembourg.

International Monetary Fund (2009), *Balance of Payments and International Investment Position Manual — Sixth Edition (BPM6)*, Washington D.C., United States.

CMFB (2017a), 'Final report on phase 1 of the CMFB task force on the consistency between national accounts and balance of payments statistics', Committee on Monetary, Financial and Balance of Payments Statistics (CMFB), February 2017, Frankfurt am Main, Germany.

CMFB (2017b), 'A harmonised European revision policy for macroeconomic statistics', Committee on Monetary, Financial and Balance of Payments Statistics (CMFB), October 2017, Frankfurt am Main, Germany.

CMFB (2018), 'Final report on phase 2 of the CMFB task force on the consistency between national accounts and BoP/IIP statistics', Committee on Monetary, Financial and Balance of Payments Statistics (CMFB), February 2017, Frankfurt.

Damia V., C. Picón Aguilar (2006), 'Quantitative quality indicators for statistics', European Central Bank, *Occasional Paper Series 54/2006*, Frankfurt am Main, Germany.

Eurostat (2018), *Quality report on balance of payments (BoP), international trade in services (ITS) and foreign direct investment (FDI) statistics — 2017 edition*, Eurostat Statistical Reports, Luxembourg.

Eurostat (2019a), *Practical guidelines for revising ESA 2010 data — 2019 edition*, Eurostat Manuals and Guidelines, Luxembourg.

Eurostat (2019b), 'Consistency between national accounts and balance of payments statistics', Eurostat Statistics Explained, Luxembourg.

Hyndman, R.J., G. Athanasopoulos (2018), *Forecasting: principles and practice*, 2nd edition, Melbourne, Australia.

Obrzut R. (2016), 'Consistency between national accounts and balance of payments statistics', *Eurostat Review on National Accounts and Macroeconomic Indicators (EURONA)*, 1/2016, Luxembourg.

Obrzut R. (2017), *Consistency between national accounts and balance of payments statistics — an updated view on the non-financial accounts — 2017 edition*, Eurostat Statistical Reports, Luxembourg.

Annex 1: Presentational differences for primary income

The standard presentation of primary income items is very heterogeneous in the national accounts and BoP due to different statistical concepts being applied. While national accounts apply standard categories D.1 to D.4 for the purpose of calculating gross national income (B.5g), BoP statistics for primary income are mainly built upon the concept of classical economic production factors (cross-border income from labour, capital and land). The only component that appears directly comparable for both statistical sources is that for the compensation of employees.

More fundamentally, the BoP concept of investment income differs considerably from the national accounts concept of property income. Investment income is compiled with regard to the functional categories of the BoP (direct, portfolio and other investment, reserve assets), while property income is structured by primary income components with regard to instrument categories (interest, distributed income of corporations, reinvested earnings on FDI, other investment income, rent). A mapping for primary income sub-items is proposed below.

The BOP concept of investment income explicitly excludes rents (item D.45), which is a standard component of property income, and records it in other primary income. However, the sector accounts do not record rent flows for the RoW sector, since according to ESA 2010 rent payments should only take place between resident units. On the other hand, the BoP summarises some national accounts standard components under the heading of 'other primary income' (taxes on production and wealth, subsidies, rent). Similarly, the national accounts standard component 'other investment income' (D.44) is not identical to the BoP heading of other primary income (see Table A1).

Table A1: Reconciling primary income concepts of balance of payments and national accounts

Balance of payments (BoP) component	BoP item	National accounts component							
		Compensation of employees	Taxes on production and imports	Subsidies	Interest	Distributed income of corporations	Reinvested earnings on FDI	Other investment income	Rent
		D.1	D.2	D.3	D.41	D.42	D.43	D.44	D.45
Compensation of employees	D.1	**x**							
Investment income					**x**	**x**	**x**	**x**	
Direct investment income	*D.4D*				*x*	*x*	*x*		
Income on equity and investment fund shares						x	x		
Dividends and withdrawals from income of quasi-corporations	D.42D					x			
Reinvested earnings	D.43D						x		
Interest	D.41D				x				
Portfolio investment income	*D.4P*				*x*	*x*		*x*	
Investment income on equity and investment fund shares						x		x	
Dividends on equity excl. investment fund shares	D.42P					x			
Investment income attributable to investment fund shareholders	D.443P							x	
Dividends	D.4431P							x	
Reinvested earnings	D.4432P							x	
Interest	D.41P				x				
Other investment income	*D.4O*				*x*	*x*		*x*	
Withdrawals from income of quasi-corporations	D.42O					x			
Interest	D.41O				x				
Investment income attributable to policy holders in insurance,pension schemes and standardised guarantee schemes	D.44O							x	
Reserve assets	*D.4R*				*x*	*x*			
Income on equity and investment fund shares	D.42R					x			
Interest	D.41R				x				
Other primary income			**x**	**x**					**x**
Taxes on production and on imports	D.2		x						
Subsidies	D.3			x					
Rent	D.45								x

Note: simplified for illustration purposes

Source: BPM6 (Appendix 9 — standard components and selected other items); ESA 2010 (Chapter 24 — allocation of primary income account)