Exchange rate source and domain data comparison

September 21st, 2020

After a first formal analysis of the dataset containing exchange rates in the Statistical Working System (SWS) a second comparison among data contained in the datasets and in the official sources has been performed and is summarized in this document.

The domains identified as containing exchange rates data are:

- Common domain (data outdated and dataset structure to review)
- Fisheries and Fisheries commodities (sharing the same source)
- Macro Statistics (part of the ECO team duties and responsible for publishing the data on FAOSTAT)
- Trade of Crop, livestock and food statistics (CLFS) team

The four domains contains some differences in the way exchange rates are treated and saved.

The issue to highlight and discuss with the teams are the following:

1. The number of decimals reported: the number is different in all the domains and should be aligned
2. The type of rate: UNSD and FAOSTAT publish the exchange rates as 'Domestic currency per USD' whereas Fisheries and Trade (CLFS) use what is called the inverse exchange rate 'USD per domestic currency' (= 1/'Domestic currency per USD') this has to be highlighted as it might impact calculations
3. The type of currency: UNSD and FAOSTAT publish the exchange rates using the Standard Local Currency (SLC) as 'Domestic currency', meaning that the exchange rates refers to the current currency even for years when the currency was not in use yet (e.g. Euro/USD exchange rate for year 1970). Fisheries instead uses as 'Domestic currency' the Local Currency Unit (LCU), i.e. the currency actually used at the reported year (hence Euro/USD exchange rates start in 1999). The first approach, based on SLC, requires exchange rates data to be saved along with the country variable (as, for example, before 1999 the Euro/USD exchange rates depend on the LCU of each country). The approach based on LCU instead can ignore the country variable as, in its validity period, a unique currency has only one exchange rate value with the USD. [1]

[1] Note: This issue seems similar to the one encountered for Population data. In FAOSTAT population data are disseminated according to the historical geopolitical structure, i.e. with breaks in the series as it happens with LCU, whereas UNSD publishes population data according to the current geopolitical structure, i.e. reconstructing time series avoiding breaks as with SLC.

Table 1 Exchange rate format saved in each domain and source

SOURCE	DECIMALS	TYPE OR RATE	CURRENCY
IMF	14	Domestic currency per USD & inverse	LCU
UNSD	15	Domestic currency per USD	SLC
FAOSTAT	4	Domestic currency per USD	SLC
FISHERIES	10	Inverse (USD per domestic currency)	LCU
TRADE (CLFS TEAM)	6	Inverse (USD per domestic currency)	Not applicable (only Euro from 2000)

The points listed need to be discussed and the content of the Exchange rate dataset in the common domain must be agreed accordingly.

Having a single dataset from where all teams can extract exchange rates will also ensure the consistency of the source used, the number of digits available and, more generally, of the values. Table 2 reports an example of the exchange rate value of the EUR/USD for 2015 (a datum that one would not expect to be problematic). Values in red highlight the inverse exchange rates. As it is shown, differences among the values are not imputable only to different rounding. The final output would indeed benefit of a unique source.

Table 2 Example of EUR/USD extraction rates reported for year 2015. Last available data for all sources.

XR year	IMF	Fisheries	Trade (CLFS)	FAOSTAT	UNSD Xpop (Macro indicators)	Data.un.org
2015	0.901296423367096	1.1095128906 = 1/0.9012964233670	1.109625	0.9017 (all countries)	0.901658961641278	0.9013

The example in table 2 opens to a larger set of data identified as problematic when comparing the data in the Fisheries domain and in FAOSTAT.

Comparing[2] the data by currency in the Fisheries domain (SWS Production environment) with the latest data published in FAOSTAT the following currency have shown value differences above 0.1 (i.e. not ascribable to rounding issues):

Australian Dollar, Chilean Peso, Cuban Peso, Egyptian Pound, Quetzal, Argentine Peso, Iraqi Dinar, Libyan Dinar, Moldovan Leu, Kyat, Naira, Nuevo Sol, Lao Kip, New Israeli Sheqel, Iceland Króna, Somali Shilling, Hryvnia, Yemeni Rial, CFA Franc BCEAO, Peso Uruguayo, Dong, Congolese Franc, Czechoslovak Koruna, Ouguiya, Dobra, Ruble, Bolivar Fuerte, Yemeni Dinar, Belarusian Ruble.

Sometimes value are completely incomparable, whereas sometimes it looks like a 'scale' problem. In the first case the more recent examples are the Iraqi Dinar (IQD, from 1970 until 2006 fisheries data are

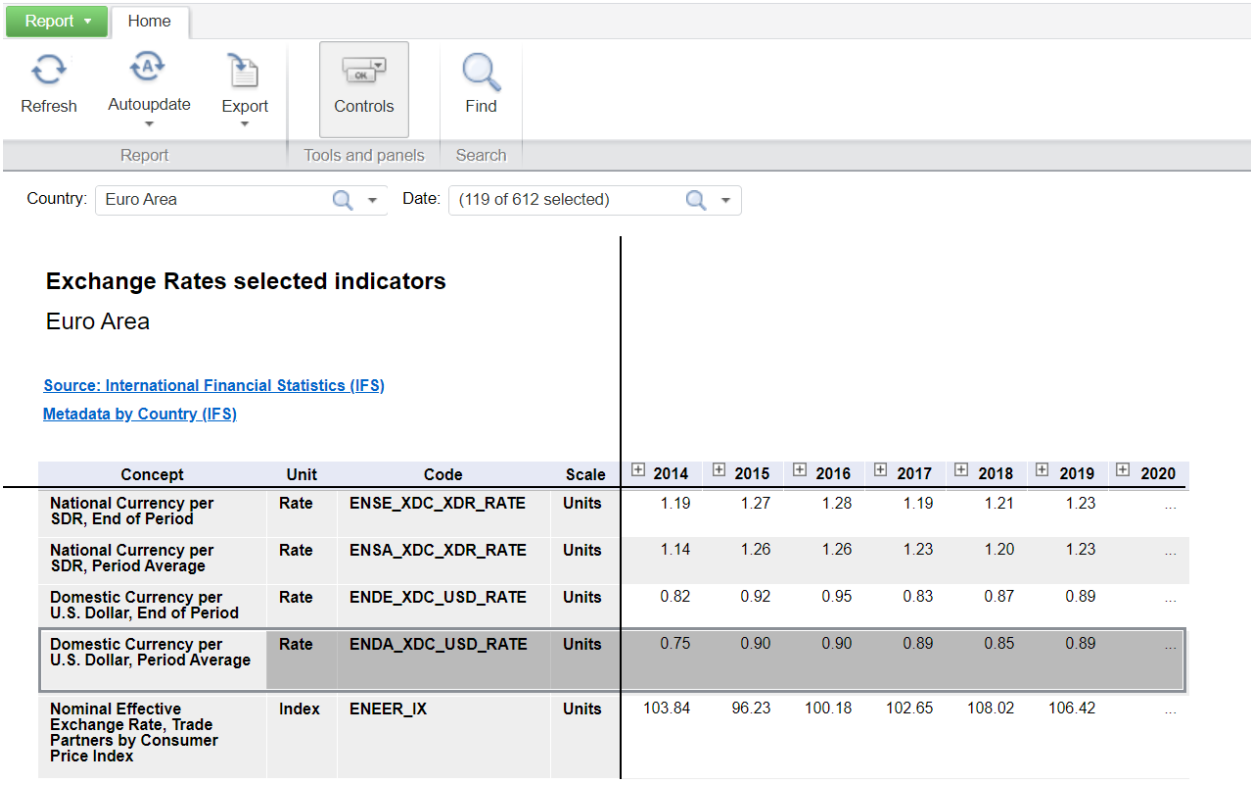
[2] The comparison has been made accounting for the fact that FIAS uses inverse rates.

non-consistent with IMF) and the Kiat (Myanmar, MMK). Scale problems have been spotted for example with the Belarusian Ruble (BYR, FIAS data are 10,000 times smaller than the FAOSTAT published ones).

Below there are screenshot of the EUR/USD example and peculiarities of each domain.

IMF

Exchange rate: domestic currency (LCU) per USD and also USD per LCU, until 14th decimal place



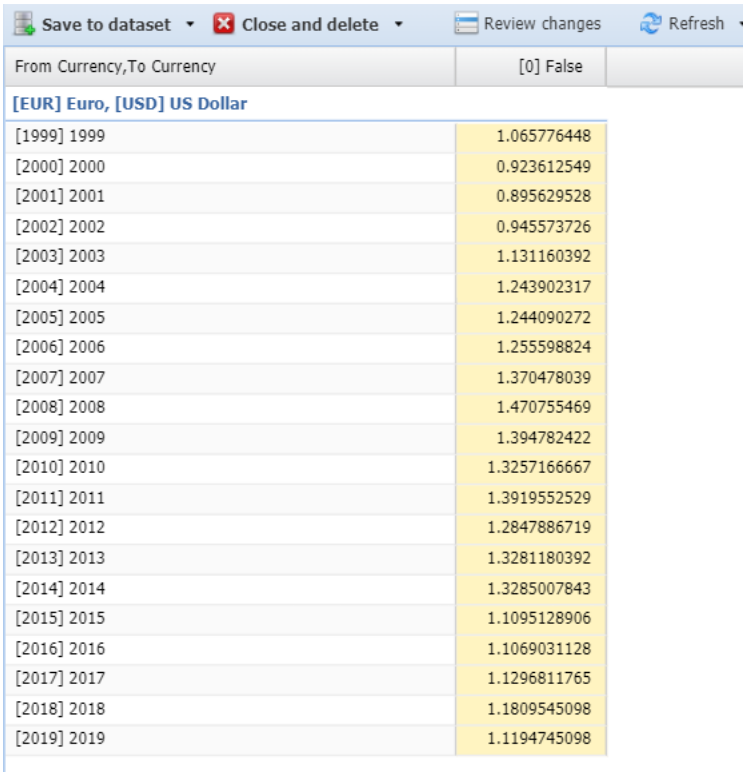
Concept	Unit	Code	Scale	2014	2015	2016	2017	2018	2019	2020
National Currency per SDR, End of Period	Rate	ENSE_XDC_XDR_RATE	Units	1.19	1.27	1.28	1.19	1.21	1.23	...
National Currency per SDR, Period Average	Rate	ENSA_XDC_XDR_RATE	Units	1.14	1.26	1.26	1.23	1.20	1.23	...
Domestic Currency per U.S. Dollar, End of Period	Rate	ENDE_XDC_USD_RATE	Units	0.82	0.92	0.95	0.83	0.87	0.89	...
Domestic Currency per U.S. Dollar, Period Average	Rate	ENDA_XDC_USD_RATE	Units	0.75	0.90	0.90	0.89	0.85	0.89	...
Nominal Effective Exchange Rate, Trade Partners by Consumer Price Index	Index	ENEER_IX	Units	103.84	96.23	100.18	102.65	108.02	106.42	...

Figure 1: IMF publishes Domestic currency per USD rates and inverse exchange rates. EUR/USD example of the first type.

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Euro Area	Exchange Rates, National Currency Per U.S. Dollar, Period Average, Rate				0.94	1.08	1.12	1.06	0.88	0.80	0.80
Italy	Exchange Rates, National Currency Per U.S. Dollar, Period Average, Rate	1,542.95	1,703.10	1,736.21							

Figure 2 IMF publishes data in domestic currency (LCU). ITL and EUR example.

Exchange rate: USD per domestic currency (LCU), until 10th decimal place



Save to dataset | Close and delete | Review changes | Refresh

From Currency,To Currency	[0] False
[EUR] Euro, [USD] US Dollar	
[1999] 1999	1.065776448
[2000] 2000	0.923612549
[2001] 2001	0.895629528
[2002] 2002	0.945573726
[2003] 2003	1.131160392
[2004] 2004	1.243902317
[2005] 2005	1.244090272
[2006] 2006	1.255598824
[2007] 2007	1.370478039
[2008] 2008	1.470755469
[2009] 2009	1.394782422
[2010] 2010	1.3257166667
[2011] 2011	1.3919552529
[2012] 2012	1.2847886719
[2013] 2013	1.3281180392
[2014] 2014	1.3285007843
[2015] 2015	1.1095128906
[2016] 2016	1.1069031128
[2017] 2017	1.1296811765
[2018] 2018	1.1809545098
[2019] 2019	1.1194745098

Figure 3 FIAS uses inverse exchange rates USD per Domestic currency referring to LCU. EUR/USD example, EUR series starts from 1999.

Trade (CLFS team)

Exchange rate: USD per domestic currency (EUR only), until 6th decimal place

Domain: trade-reference-files Table: EUR/USD conversion

ID	Country	Year	Exchange Rate
103	Euro zone	2000	0.92402
307	Euro zone	2001	0.89286
642	Euro zone	2002	0.946
920	Euro zone	2003	1.1312
1111	Euro zone	2004	1.243304
1261	Euro zone	2005	1.245755
1450	Euro zone	2006	1.25565
1620	Euro zone	2007	1.37064
1826	Euro zone	2008	1.47171
2013	Euro zone	2009	1.3928
2231	Euro zone	2010	1.32689
2455	Euro zone	2011	1.39141
2597	Euro zone	2012	1.28557
2842	Euro zone	2013	1.32816
	Euro zone	2014	1.32884
	Euro zone	2015	1.109625
	Euro zone	2016	1.10661
0	Euro zone	2017	1.1297
	Euro zone	2018	1.1810

Figure 4 Trade CLFS team uses inverse exchange rates USD per Domestic currency only for Euro starting from 2000.

FAOSTAT (ECO team)

Exchange rate: domestic currency (SLC) per USD, until 4th decimal place

Area	Item Cc	Item	ISO Cur	Year Co	Value	Flag	Note
Italy	5540	Standard local currency units per USD	EUR	2019	0.8929	X	Annual average of UN Operational Rates of Exchange
Italy	5540	Standard local currency units per USD	EUR	2018	0.8468	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2017	0.8852	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2016	0.904	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2015	0.9017	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2014	0.7537	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2013	0.7532	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2012	0.7783	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2011	0.7194	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2010	0.755	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2009	0.7198	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2008	0.6827	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2007	0.7306	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2006	0.7971	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2005	0.8041	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2004	0.8054	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2003	0.886	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2002	1.0626	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2001	1.1175	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	2000	1.0854	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	1999	0.9386	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	1998	0.8967	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	1997	0.8796	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	1996	0.7969	X	Data from UNSD AMA
Italy	5540	Standard local currency units per USD	EUR	1995	0.8413	X	Data from UNSD AMA

Figure 5 ECO team publishes exchange rates referring to SLC. Example of Italy with EUR/USD exchange rates from 1995 until 2019 (the series actually starts from 1970 as all the others).

Area	Item C	Item	ISO Cur	Year C	Value	Flag	Note
Slovakia	5540	Standard	EUR	2000	1.52810000000	X	Data from UNSD AMA
Lithuania	5540	Standard	EUR	2000	1.15850000000	X	Data from UNSD AMA
Andorra	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Austria	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Belgium	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Finland	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
France	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Germany	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Ireland	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Italy	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Luxembourg	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Monaco	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Montenegro	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Netherlands	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Portugal	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
San Marino	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Spain	5540	Standard	EUR	2000	1.08540000000	X	Data from UNSD AMA
Estonia	5540	Standard	EUR	2000	1.08450000000	X	Data from UNSD AMA
Greece	5540	Standard	EUR	2000	1.07230000000	X	Data from UNSD AMA
Cyprus	5540	Standard	EUR	2000	1.06340000000	X	Data from UNSD AMA
Malta	5540	Standard	EUR	2000	1.02060000000	X	Data from UNSD AMA
Slovenia	5540	Standard	EUR	2000	0.92910000000	X	Data from UNSD AMA
Latvia	5540	Standard	EUR	2000	0.86300000000	X	Data from UNSD AMA

Figure 6 Country specific EUR/USD exchange rates in year 2000. Countries not yet in the Euro Area have different values due to the SLC approach.

UNSD link!

Depending on the method to download data from UNSD the data obtained are different. When using the API (https://unstats.un.org/unsd/amaapi/api/file/30) the results is the one published in FAOSTAT and used by the ECO team. When using the link http://data.un.org/ some data differ. E.g. exchange rate for Slovakia in 2015 from the API downloaded file is 0.90165896, the same rate from the file downloaded from data.un.org is 0.9013.

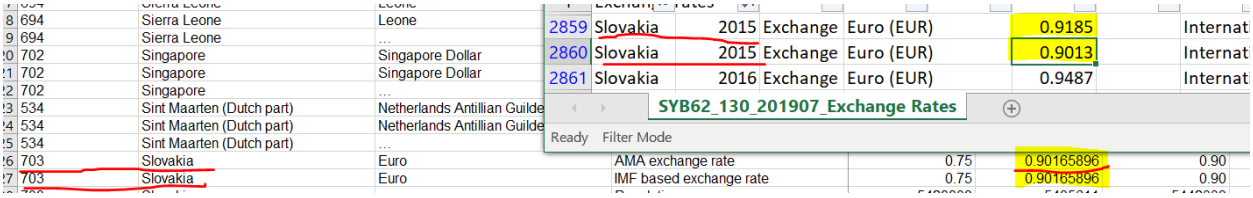


Figure 7 UNSD exchange rates emerging inconsistency