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Micro-data linking and macroeconomic indicators: First results for Switzerland

Abstract

Combining the information of different administrative sources to derive new characteristics is relatively new in Switzerland. The unique business identifier (UID) has been gradually introduced in the various fields/registers and is systematically used since 2016. Thanks to the UID, it is now possible to link data from the statistical business register with customs data, VAT data, and data collected in business surveys. The paper will focus on first results for Switzerland. Customs data show for example that six firms active in the manufacture of basic metals accounted in 2016 for 18% of all exports of goods and for 29% of all imports mainly because of their business with non-monetary gold. The distinction made in customs declarations between importers and consignees gives interesting insights on their activities and their role within domestic or international MNE and informs to some extent about the ownership of goods crossing the Swiss border. Customs data also allows pinning down the trade activities of non-established firms and to shed light on the kind of activities they undertake in Switzerland. The paper will also review first results of the comparison between VAT turnover and turnover collected in surveys. Results contrast sharply in certain areas (precious metals, electricity, lotteries,). This may be due to different elements like the way enterprises report some results (gross versus net), the way a margin is calculated or the fact that it is difficult to split values given by one responding unit on the various entities that constitute a group. Subsidies play also a specific role in areas like transport, health and entertainment. Special attention was devoted to large groups that are often heterogeneous world actors. Here VAT data may be biased by fiscal optimization, distorting transfer pricing schemes and the fragmentation of the production process. Insights about the structure of the groups are key elements in understanding the results and often provide very useful information on the way some positions may be interpreted or corrected. These first results show that administrative data are a precious help in the consolidation process and consistency analysis of macroeconomic indicators (National Accounts, productivity Analysis, etc.) but they illustrate also that economic reality is difficult to grasp. The use of secondary data also raises concerns about the impact of changes in these sources on the statistical production process (What does for example a NSI do if there are changes in the definition or the content of variables? Etc.). Thus there are still a large number of questions left unanswered so far.

Keywords: Linking of administrative data; new characteristics of enterprises; globalization.

Text

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1. Introduction

Like many other national statistical institutes (NSIs), the Federal statistical office (FSO) is confronted with a growing reluctance of individuals and firms to provide data. At the same time, users have a long list of areas of interest. Recent examples are the impact of digitalization and globalization on the economy. One promising option to solve these conflicting trends is matching the information of administrative sources and of surveys. Administrative sources are often fully-fledged and can thus offer insights on units that do not appear/are unwilling to participate in surveys. Combining various sources can create new characteristics of firms and thus open new avenues of thought.

An important prerequisite is that all firms active in the domestic economy are identified and filed in a centralized register. This is the case in Switzerland since 2011, when a unique enterprise identification number (UID) was allocated to each enterprise[1]. The UID has become the backbone of the strategy of the Swiss government to streamline and modernize the interactions with enterprises, be it for administrative or for statistical purposes. The FSO plays here a key role, as it manages the UID register.

Over time, the role of the UID in Switzerland has increased tremendously. Since 2016 for example, it is compulsory for customs declarations. It also provides the backbone for the reference used for Value Added Tax (VAT) purposes. It is thus technically possible to link data from the Swiss business and enterprise register (BER[2]) with customs data, VAT data and data collected in Business surveys. While this offers new opportunities, it does not mean that connecting data will solve all statistical problems / wishes of stakeholders. As a matter of fact, there are a number of limiting elements. For example, definitions may differ in registers and surveys; fiscal optimization may impact on the content of data (VAT, etc.); granularity of the information may be limited; etc.

This being said, combining various data sources is definitely an important avenue of thought and investigation at the FSO. During the past two years, a great amount of time and energy was devoted to the analysis of results of the connection:

- of customs declarations – BER – short term statistics (STS) for a specific branch (NACE 24)
- of VAT data –BER - structural business statistics (SBS).

First results are presented in this paper. The conceptual framework stems mainly from National Accounts (NA). This has a number of implications, like the reference to the domestic economy or concepts like “production value”, “intermediate consumption” and “value added” which are specific to NA.

The document is structured as follows: in the next chapter, we will provide some stylized facts about VAT data and customs declarations in Switzerland. This chapter illustrates the fact that data characteristics have an impact on the analytical options. Chapter 3 presents first results from case studies carried out in the two areas mentioned above and explores the next steps which the FSO might consider in the near future. Chapter 4 provides a summary and first conclusions.

[1] If not specified differently, the wordings “enterprise”, “firm” or “unit” are used with the same meaning. Basically they all refer to the legal entities.
[2] For more information, please see: https://www.bfs.admin.ch/bfs/en/home/registers/enterprise-register.html

2. Stylized facts about Swiss VAT and Customs data

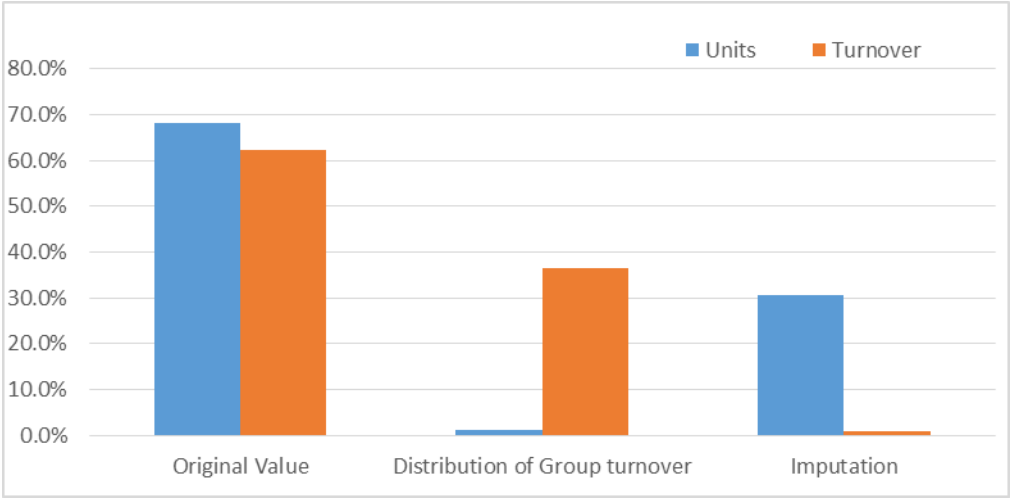
A. VAT data

Since the reference year 2011, the FSO integrates and uses information from the VAT Register hosted by the Swiss Federal Tax Administration (FTA). The data of VAT Register is connected to the BER with the help of the UID. The data not only concerns total turnover subject to VAT (i.e., total net turnover) but also turnover of services realized abroad or turnover exonerated from VAT for example.

About two thirds of the firms contained in the BER provide information to the VAT register. One third of firms is "missing", as various activities are exempted from VAT by law (e.g. finance, real estate, health, etc.). Besides, businesses do not have to report to tax authorities for VAT purposes if their turnover does not exceed 100'000 Swiss francs per year. Finally, some units do not report as they are part of a group. In this case, the group declares the turnover once a year for all the units that belong to it[3].

In the BER, the "missing" third is assessed through imputation for missing value or distribution of aggregated value. The following figure gives an indication about the importance of the various elements.

Figure 1: Share of units and turnover according to the calculation method (2015)



Source: FSO

As can be seen, 62,4% of total turnover come from original values in 2015. Turnover from VAT groups is important (36.6%), in particular when compared to the number of units concerned (1,2% of the units contained in the BER are part of a taxation group). Only 1% of total turnover is estimated by imputation methods.

B. Customs data

The Federal Customs Administration (FCA) produces the International Merchandise Trade Statistics (IMTS). Since the use of UID became compulsory in 2016, the FCA also produces, in a joint effort with the FSO, the statistics about Trade by Enterprise Characteristics (TEC). With a few exceptions, only information from customs declarations and BER served to produce these statistics. FCA performs specific controls and corrections on the raw data of the customs declarations in order to

3 Enterprises that are united under a unique management (e.g. Enterprise group) can ask to be treated as a single contributor (taxation group). It follows that intra-group services (i.e. services mutually charged between firms inside the group) must not be taxed. For more information please consult : https://www.estv.admin.ch/estv/en/home/mehrwertsteuer/dienstleistungen/mwst-abrechnung-online.html

ensure the quality of the statistical information used to produce IMTS and TEC. For the latter statistics, checking the validity of the UID is very important. It is the task of the FSO to control the UID of the exporter (in the customs declaration for exports) and the UID of the importer (in the customs declaration for imports).

When controls and corrections are finished, customs declarations are stored in a centralized database hosted by the FCA. The FSO has a direct access to this database in order to withdraw the information it needs. Currently, results from the micro-data linkage are available for the years 2016 and 2017. The information from customs declarations includes the following variables:

- Date of the customs declaration, UID of the business (link to the BER)
- Name/address/zip/town of the importer, consignee or exporter on the Swiss customs territory
- Name/country code of the foreign sender or foreign consignee
- Transportation mode
- 8-digit Swiss tariff headings
- Statistical value (price of goods invoiced in CHF at the border)
- Net weight
- Code of country of origin of the goods (import) or code of final destination (export)
- National taxation codes (normal imports/exports, returned goods and processing)
- Product description.

C. Some brief comment

Customs and VAT data have different histories and are produced in different settings. The FCA has produced statistics for a long time and the foreign trade statistics[4] undergo various steps/procedures in order to be compatible with international standards. In contrast FTA data is collected for taxation purposes mainly. As explained above, there are loopholes for statistical uses. The results of combined databases in those two areas will thus raise different interpretation/statistical issues.
Besides data which is collected for non-statistical purposes often have weaknesses when the intention is to produce coherent statistical results. For example, one generic information may be useful and sufficient for fiscal objectives whereas statistical procedures might require branch-specific treatments which are often not systematically implemented. In an ideal world these needs should be considered at the very beginning of the administrative collection process but this is currently difficult in Switzerland.
Finally administrative information may change over time (contents, frequencies, etc.). This may be due to various reasons like changes in regulations, the will to reduce the burden on respondents, or internal reorganizations of the data provider. If statistics are not consulted at an early stage this will impact on potential use of administrative data in statistics.

3. Case studies and first findings

Case study 1: Comparison of turnover from surveys with turnover from administrative data

As mentioned above, the VAT register provides information on turnover for all enterprises which are subjected by law to VAT, whether the latter has ultimately to be paid or not. Missing values are (a) imputed for units which are exonerated of VAT or are under the threshold and (b) apportioned for units belonging to groups.

[4] More information are available here : https://www.ezv.admin.ch/ezv/en/home/topics/swiss-foreign-trade-statistics.html

The Production and value added statistics (WV)[5] is a yearly survey based on a sample[6] which collects accounting information on legal units (balance sheets and profit and loss accounts). Most branches are covered by the survey, with the notable exceptions of agriculture, the financial sector (banks and insurances), and central government[7].

This case study had the following objectives:

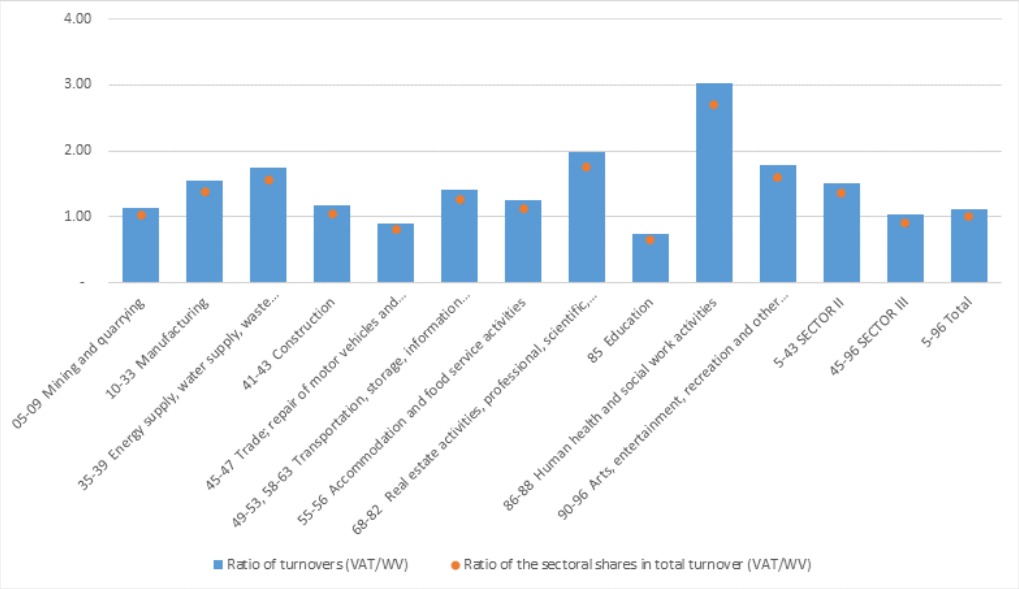
1. Identify branches where turnover figures differ significantly between VAT and WV;
2. Analyze these branches in order to identify elements which might explain these differences (e.g. calendar year effects, different definitions, etc.)
3. Decide the best way to use turnover data.

These points are developed below:

1. Identification of branches where figures differ significantly

The following figure gives a first overview of the turnover differences in the aggregated branches (NACE classification).

Figure 2: Ratio (absolute/relative) of the difference between turnover in VAT and WV



Source: FSO

The blue bars of the figure show the results of a comparison exercise of turnovers. When the value is equal or close to one on the vertical axe it means that the value for turnover in VAT and WV is very similar. This is the case for example in the construction sector. When the value is below one, it means that WV is higher than VAT. This is the case for Education and Trade. In the first case exemption from VAT explains the situation. For Trade, the explanation rather lies in the heterogeneity of firms (huge units v. very small units). When the value is higher than one, turnover in VAT is higher than turnover in WV. This is the case for a majority of branches.

As can be seen in the figure differences are particularly marked in individual branches in the service sector. The spread is much lower in the individual branches in the industry sector, in particular for units which have only one production facility. In this case, data from both sources are very similar, with the exception of the energy sector. For smaller units, VAT data is thus a good alternative for

[5] For more information relating to this statistics, please see: https://www.bfs.admin.ch/bfs/en/home/statistics/industry-services/surveys/ws.html

[6] The sample includes approximately 22,000 enterprises. The response rate is around 90% for large enterprises, 70% for medium-sized enterprises and 55% for small enterprises.

[7] For more details please see the following publication (available only in French and German), in particular Chapter 3: https://www.bfs.admin.ch/bfs/fr/home/statistiques/industrie-services/statistique-valeur-ajoutee.assetdetail.3202428.html

information on units that do not participate or are excluded from the survey. As the unit becomes bigger, differences tend to increase, especially if the unit has a complex structure. This is –among other things- due to the treatment of groups, where data collected by a central unit are apportioned to the group units by the SFO.

The structure of the economy also differs depending on the source used. This can be seen in the figure above with the red dots. These show the ratio of the share of each branch to the total turnover according to VAT and WV.

2. Generic elements which can help to understand the differences

Many elements may play a role and thus help to interpret differences between the two sources. Here is an overview of the main points:

(a) Content of the information provided by the enterprises: Basically, all units should give their total turnover figures to VAT, and then deduct the amount of turnover which is not taxable. Research has shown that a number of units declare only net value. There may thus be a real bias –especially in the service sector- between the (gross) figure of the WV survey and the (net) figure of VAT. Besides, according to NA, subsidies should not be part of production, and thus of turnover. Here again, some firms declare turnover including subsidies to VAT, and then deduct these in a second step. Information from VAT registers may help to correct the situation, but the exercise is very demanding in time and human resources. The impact of subsidies is strong in branches like Education, Social work activities, Creative, arts and entertainment activities, and Scientific research and development. Finally the turnover of some firms may include the sale of assets in their VAT declaration. These sales should not be part of the production value according to NA. Unfortunately these amounts cannot be excluded from VAT data. These can thus be very different from figures reported in the WV survey.

(b) Changes in inventories: In a given year T, total supply (turnover) may originate either from production in T or from the use of stocks originating in T-1, T-2, etc. The latter logically is not part of production of T and thus the collection of data should be structured in order to distinguish the part of turnover linked to current production from the part originating in the depletion of stocks. The problem here is that some enterprises report turnover inclusive changes in inventories to VAT, and it is impossible to correct the figure. If such a situation occurs in the WV survey, accounting information make it possible to adapt/interpret correctly the data.

(c) Trading, gambling, and special activities: when a unit trades a good, only the margin should be considered as production according to NA. While the WV survey gives clear indications in this regard, VAT figures generally indicate gross values. This leads to large differences in branches like Electricity, gas, steam and air conditioning supply or Real estate activities. The same holds true for units active in gambling activities.

(d) Declaration by one unit for a group and subsequent allocation on units which are members of the group: basically allocation in the BER is done by using the ratio turnover/head which is valid for the group; this ratio is then combined with the economic activity and with the number of jobs allocated to each unit in order to calculate individual results. This may be fine for the industry sector, where the relationship between turnover and jobs stills makes some sense[8]. This is far more debatable in the service sector, where a very high turnover may be obtained with very few persons. Thus, data may differ sharply in some service industries between imputed figures in the BER and figures reported by the enterprise in the WV survey. Besides, as mentioned previously, turnover for groups is consolidated. As such intra-group

[8] One should note that this relationship is weakening also in the industry sector as global value chains gain in importance.

services must not be taxed. It follows that allocation of global turnover on units of the group will give lower results than information declared by each unit to the WV survey.

Of course, other elements may play a role, and some branches are more prone to statistical challenges than others. The FSO has for example analyzed in detail the turnover of units specialized in precious metal transactions[9]. Here, some operations are carried out on behalf of third parties while others may be done on own account. Conceptually, this impacts on the treatment of the flows, and detailed information is important. The second case study (see below) examines this branch (NACE 24) specifically in regard to exports and imports.

These various examples illustrate the fact that the interpretation of the results of micro-data linkages is not straightforward. All available information should be combined in order to grasp properly the economic situation, but this implies complex analysis and is demanding both in time and in resources.

3. The way ahead

For the time being, there is no clear-cut decision/rule regarding the proper use of VAT data in the production of statistics. This source is definitely very precious - here two examples:

- The fully-fledge nature of VAT register makes it possible to identify units with no or very little employment which never appear in the WV. These units do play a role and must thus be taken on board when analyzing the Swiss economy. VAT registers were also very useful for the delineation of the FATS[10] universe or for the definition of small and medium enterprises (SME). In both cases, figures based only on employment data would have been misleading and the inclusion of turnover from VAT enabled a better understanding of economic reality.
- VAT data is often very helpful as an auxiliary variable. This is the case for example in price statistics or in the process of designing samples and weights. NA currently do not directly use VAT data for the calculation of Gross domestic product (GDP). The main source of information for monetary flows of enterprises is the WV survey, and this will still be the case in the near future. However, the role of VAT data is growing as an auxiliary variable in the balancing process of GDP. In particular it helps when data is missing in the WV or when information on firms seems difficult to interpret.

There are still many open questions regarding the differences between VAT and WV results. The FSO will invest more time and resources to investigate these differences. Once the exercise is finished, a more modular approach to the use of VAT in the statistical production may eventually be implemented, but more time is needed to fully understand the setting.

Case study 2: Using Customs data to analyze the activities related to the "Manufacture of basic metals"

As mentioned above customs data have a long statistical history. Thus micro-data linkage of customs offers potential to stick better to the international standards, especially to the change of economic ownership principle which is central to NA and Balance of payments (BoP) manuals. This case study focuses on units active in the manufacture of basic metals (NACE 24). This branch is characterized by very large volumes, a high concentration of actors and intense cross-border trading. It is typically a branch where the import content of exports is very high. Moreover, some firms may formally import

[9] „ Under this economic activity, the economic actor purchases the materials (Gold) and provides manufacturing services for transforming the physical inputs into another product (refined and processed Gold). This latter activity is referred to as manufacturing services on physical inputs owned by others. As long as the input-gold has been altered and consequently not remained in the same condition as received, then the turnover from the sales of the processed and refined gold is not a 'Gross margin on goods for resale'. The turnover must comprise the total invoiced during the reference period and this correspond to market sales of goods (sales from the final processed gold) and services (support services of precious metal trading). " from Eurostat recommendations.

[10] Statistics on the structure and activity of foreign affiliates (FATS). For more information, please see : http://ec.europa.eu/eurostat/web/structural-business-statistics/global-value-chains/foreign-affiliates?p_p_id=NavTreeportletprod_WAR_NavTreeportletprod_INSTANCE_MlPTx882pcau&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_pos=1&p_p_col_count=3

precious metals and –as such- appear in the customs declaration, although they do not perform the transformation of the physical inputs into another product (refined gold for example). As such it raises interesting questions on the proper interpretation of the linkage exercise.

1. Trade figures

The tables below present trade figures for six firms of the manufacture of basic metals sector. Table 1 and Table 2 present imports (according to the importer) and exports of these firms. Table 3 shows imports according to the consignee perspective, which means according to the name of the company to whom goods are officially sent or delivered in the domestic economy. In the case of basic metals, this perspective gives interesting insights about the organization of the market and the relations between the actors.

Table 1: Exports of six firms of the NACE 24 (2016 data, Swiss francs)

	Total exports	Rank among exporters	Exports of nonmonetary gold	Exports of nonmonetary gold (%)	Special customs regimes (%)
A	989'482'318	33	353'410'272	35.7%	0.0%
B	9'965'134'450	7	9'306'831'853	93.4%	0.0%
C	328'897'801	>50	302'602'304	92.0%	0.0%
D	21'231'953'893	2	21'085'702'024	99.3%	0.0%
E	19'495'439'881	3	17'202'741'113	88.2%	0.0%
F	67'504'318	>50	150'949	0.2%	0.0%
	52'078'412'661		48'251'438'515	92.7%	0.0%

Source: FCA

Table 2: Imports (importer perspective) of six firms of the NACE 24 (2016 data, Swiss francs)

	Total imports	Rank among importers	Imports of nonmonetary gold	Imports of nonmonetary gold (%)	Special customs regimes (%)
A	130'767'546	>50	43'839'924	33.5%	0.9%
B	12'059'636'341	5	10'904'087'418	90.4%	0.0%
C	236'917'008	>50	47'096'144	19.9%	0.0%
D	27'176'138'339	1	26'899'799'848	99.0%	0.3%
E	18'426'834'640	2	15'523'904'248	84.2%	0.0%
F	7'600'621	>50	344'331	4.5%	11.6%
	58'037'894'495		53'419'071'913	92.0%	0.1%

Source: FCA

Here some stylized findings:

- Total gross imports and exports of these 6 firms are very large (see column 2). Overall, in 2016, they accounted for 17.6% of all exports of goods and for 22.2% (as an importer) of all imports of goods for Switzerland.
- Some of the firms belong to the largest Swiss importers and exporters (see column 3). Firms D and E for example play a crucial role as they appear prominently both as an importer and as an exporter.
- Trade in nonmonetary gold[11] is highly concentrated on these firms. As a matter of fact, they account for 62,7% of exports resp. 65,7% (as an importer) of imports of nonmonetary gold[12].
- With the exception of firm F, nonmonetary gold generally represents the large majority of the merchandise flows (see columns 4 and 5).

[11] Nonmonetary gold is made up of gold ore, scrap material and investment bars. The corresponding 8-digit Swiss tariff number is 7108.1200.

[12] The six firms represent 100% of the imports and exports of nonmonetary gold from the NACE 24. Other branches that play a significant role in the imports and exports of nonmonetary gold are the "Wholesale trade, except of motor vehicles and motorcycles" sector (NACE 46) and the "Financial service activities, except insurance and pension funding" sector (NACE 64).

- In 2016, total imports outweigh total exports. This is mainly due to the trade imbalance of firm D in nonmonetary gold.
- In general, the processing activity does not change substantially the nature of the gold, which means that the gold remains classified in the position 7108.1200 when "reexported"[13]. Therefore, the kind of processing activities performed in NACE 24 would rather point in the opposite direction than the trade deficit in nonmonetary gold observed for this sector.
- Special customs regimes (returned goods, processing) only represent a marginal share of the merchandise flows (see column 6). This is not really a surprise as customs duties and VAT are zero on imported nonmonetary gold. As such, national taxation codes give no clue whether gold crossing the border is subject to a change of economic ownership or not. In other words, national accountants have nearly no information to perform ad hoc corrections on IMTS figures to stick to the change of economic ownership principle.

Presenting imports according to the consignee perspective provides further insights.

Table 3: Imports (consignee perspective) of six firms of the NACE 24 (2016 data, Swiss francs)

	Total imports	Rank among consignees	Imports of nonmonetary gold	Imports of nonmonetary gold (%)	Special customs regimes (%)
A	17'186'351'157	3	16'728'506'632	97.3%	0.0%
B	12'197'464'141	4	11'040'057'776	90.5%	0.0%
C	237'299'139	>50	47'096'144	19.8%	0.0%
D	27'547'736'463	1	27'270'904'570	99.0%	0.3%
E	19'111'808'502	2	16'097'468'127	84.2%	0.0%
F	8'420'599	>50	303'933	3.6%	10.3%
	76'289'080'001		71'184'337'182	93.3%	0.1%

Source: FCA

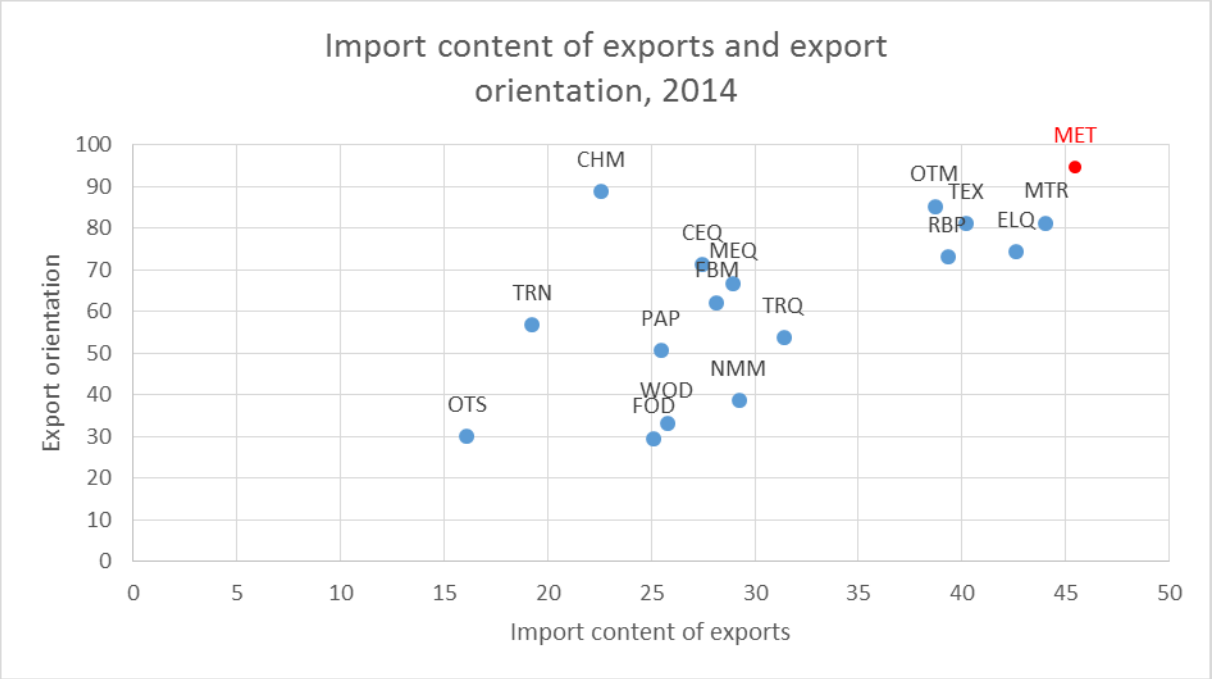
Results of Table 3 are striking for firm A. Using the consignee perspective, it receives merchandises worth 17,2 billion CHF (of which 97,3% of nonmonetary gold). When compared to the results of Table 2, that shows total imports of only 131 million CHF (of which 33,5% of nonmonetary gold), the picture is thus completely different. It is an interesting feature since it strongly hints towards a case of inward processing. With the consignee perspective, the six firms accounted in 2016 for 29,2% of all imports of goods and for 87,6% of imports of nonmonetary gold made by Swiss firms.

2. Integration of NACE 24 in the global production chain

According to the OECD, in Switzerland, the manufacture of basic metals sector (NACE 24) is characterized by the highest import content of exports (i.e., the highest foreign value added share of gross exports) and the highest export orientation (i.e., the highest share of domestic value added embodied in foreign final demand) among all economic sectors (see figure 3 below). The former characteristic is in particular an indicator of the integration of the sector within global value chains (GVCs)[14]. The latter indicator points to the fact that firms from the NACE 24 export their services and that their historical link with the Swiss watchmaking, jewelry and banking industry has weakened. The current ownership structure of the six firms reflects these characteristics as these are mainly owned by non-residents.

[13] For some firms participating in this business, this has also implications on their classification as discussed below.
[14] For more details, please refer to: http://www.oecd.org/fr/sti/ind/global-value-chains.htm

Figure 3: Import content of exports and export orientation (data for 2014)



Source: OECD (2017), Switzerland: Trade and Investment Statistical Note
MET = basic metals

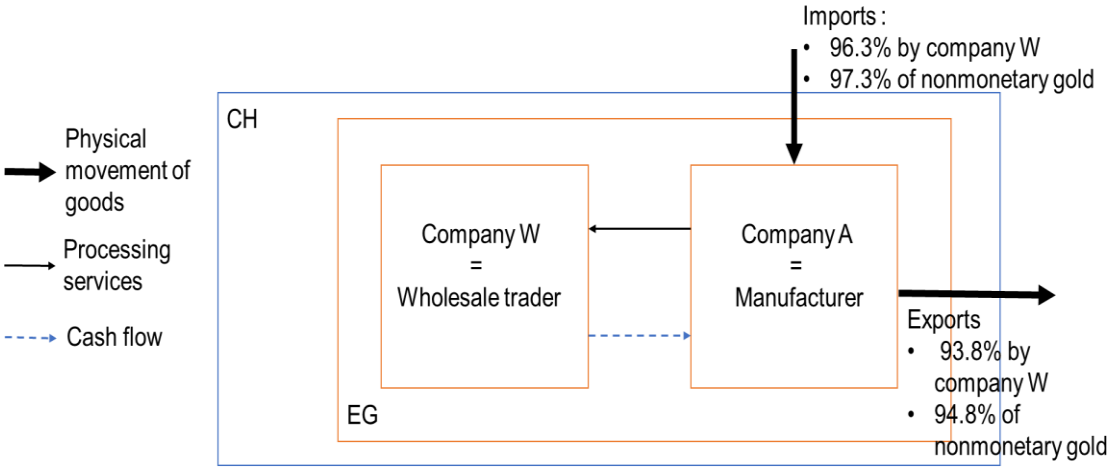
3. First analysis of business models of firms active in NACE 24

The striking feature of firm A with respect to its trade figures was mentioned above. In 2016, it received 16,7 billion CHF of nonmonetary gold although it only imported 44 million CHF of nonmonetary gold. This means that firm A rarely stands as the importer on the customs declaration but as the consignee. Nonmonetary gold sent to firm A is primarily imported by firm W, which is a Swiss non-financial corporation classified in « Wholesale of metals and metal ores ». This seems to be a reasonable classification if firm W owns the gold. Indeed, the transformation performed by firm A is in general not significant enough to change the 8-digit Swiss tariff number after processing[15].

Firms A and W belong to the same foreign multinational enterprise group, with the parent company being located in the EU. Firm A does not own the gold and charges firm W for the processing services. For 2016, firm A reported to the FSO that 80% of its annual turnover was generated via the provision of processing (i.e. refining) services on the domestic market. Once refined, nonmonetary gold is « reexported » from firm A's location by firm W primarily to Asia. Figure 4 gives an overview of firm A's business model.

[15] If firm W does not own the gold, it should probably be classified as a firm conducting « Wholesale on a fee or contract basis ». Firm W's financial statement seems to indicate that both situations in terms of gold ownership coexist.

Figure 4: Business model of Firm A



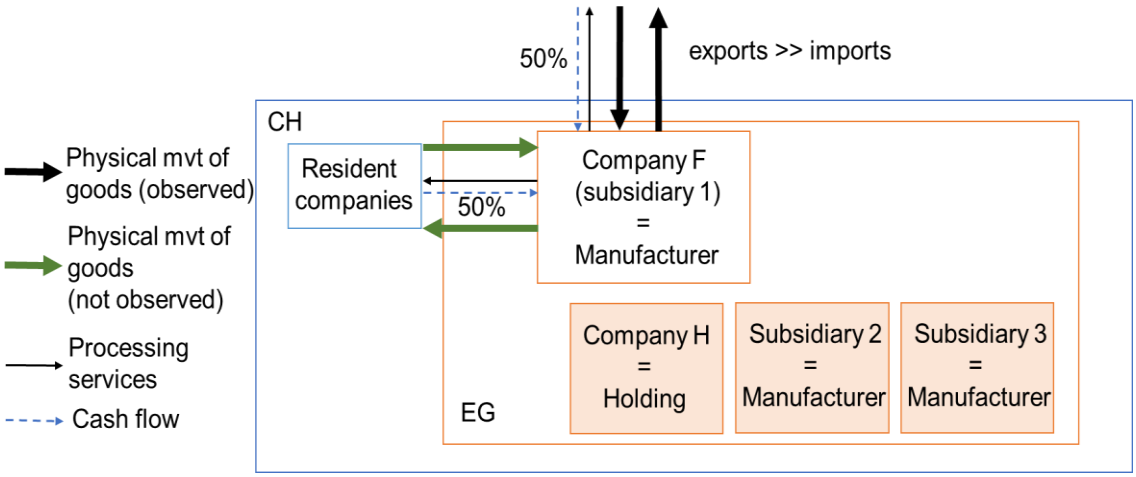
Source: FCA, FSO

Compared to firm A, the business model of firm F (as shown in Figure 5 below) is completely different in several respects:

- The role of nonmonetary gold for firm F is marginal.
- Firm F is part of a Swiss multinational enterprise group. Apparently, there are no flows of goods and services between the different Swiss entities of the group. « Intra-group trade » is limited (10,5% of imports, 15,1% of exports)[16].
- On the import side, firm F generally stands both as the importer and as the consignee on customs declarations.
- Firm F exported in 2016 much more than it imported (67.5 million CHF versus 7.6 million CHF). Furthermore, the difference in imports between the importer and consignee perspective was small (7.6 million CHF versus 8.4 million). Overall, this suggests that firm F is involved in a complex GVC where some unrelated resident firms first imported and perhaps also transformed the goods (metals) eventually processed and exported by firm F.
- Processing fees account for nearly all the turnover of firm F, which means that firm F does not own the merchandise but charges unrelated firms (or their parent in Switzerland or abroad) for the processing services. In contrast to firm A, the share of exported services is much larger for firm F. It attained roughly 50% in 2016. In these cases, non-resident entities own the merchandises.

[16] «Intra-group trade » has been identified using the name of the foreign firms contained in the customs declarations and different other sources (FATS, Dun & Bradstreet database).

Figure 5: Business model of Firm F



Source: FCA, FSO

The analysis of business models is a new avenue of thought at the SFO. Micro-data linkage provides new insights, but –as shown above- each actor seems to be special. This being said, given the importance of the manufacture of basic metals in Switzerland, more resources will be invested in this area, as it is a prime example of the integration of Swiss firms in GVCs that needs to be fully understood and documented.

4. The way ahead

The case study presented above focusses on data linking and findings for a specific branch. The exercise may of course be extended to other branches where customs data are significant. More generally, customs data offer a huge potential for further analysis. Here is a short list of current candidates for further research at the SFO:

- Exports and imports by institutional sector as defined in NA: Several foreign territories (Liechtenstein, international organizations, etc.) are part of the Swiss customs territory. Exports and imports of firms located in these territories (i.e. exports and imports of non-resident firms) are included in IMTS. The analyses performed so far indicate that exports from and imports to Liechtenstein are the largest among these foreign territories, and that flows related to the other territories are marginal. According to the definition of the domestic economy, these flows should be excluded from GDP. Thus, exports and imports related to Liechtenstein should be excluded from the Swiss NA. While the conceptual answer is quite straightforward, its implementation is more difficult, since the customs union makes it difficult to disentangle the flows (imports intended for the Swiss market, exports of Swiss goods). Here customs data will be useful for further analysis.
- Exports and imports by legal forms: this analysis will allow identifying the trade by non-established firms. These firms have no physical presence in Switzerland but trade goods which cross the Swiss border. In some instances, their imports and exports are large, while employment may be very low or zero. In this case, these firms are deemed inactive and they do not appear in surveys. However, if they pay the VAT in Switzerland or import to or export from Switzerland, they receive an UID and connecting data thus makes it possible to catch these special cases. Here, like for VAT data, customs data are essential to detect the existence of such units and to keep track of their activities and of the firm's behavior. This analysis should give insights on topics like change of economic ownership, inward processing, or digital trade.
- Private imports and exports (returned goods): The cross-border purchases of resident households from foreign online retailers and e-platforms increased significantly in recent years. As a result, physical flows of goods at the border should have increased for imports but also for exports

(returned goods). This increase does not necessarily translate into higher IMTS figures due to the existence of simplified or reduced customs declaration ("below-the-threshold trade"). For NA purposes, data from reduced customs declarations are used to supplement IMTS figures. The preliminary analyses performed so far indicate that the proportion of declared returned goods in exports by resident households reached 4,1% in 2016. The proportion was 66,6% for apparel and clothing accessories and even 71,3% for footwear. These results suggest that digital trade appears in IMTS, at least on the export side. However, several issues remain unanswered, as for example the question of who imports digitally ordered goods. Currently, only few firms have access to the reduced customs declaration form for small shipments. This is not the case of private persons. On the export side, an open question is whether firms that import digitally ordered goods also export them when they are returned. If so, do they use the reduced customs declaration form (which differs to some extent from the one available for imports)? Another point that needs to be clarified is whether customs declarations are filled with the correct national taxation codes when goods are returned.

In addition, customs data will be valuable inputs for the production of additional variables in the BER, for the production of a producer export price index in the pharma industry, for the identification of active foreign affiliates and for the production of trade variables for IFATS. There is thus a very vast array of new products which could be produced in the near future by the FSO.

4. Summary and first conclusions

Combining the information of administrative sources is relatively new in Switzerland. The same holds true for the linkage between administrative sources and surveys. The introduction of the UID in 2011 provided the proper setting for these micro-data linkage and thus opened new opportunities to better understand the Swiss economy. The SFO has conducted a limited number of case studies in order to evaluate this potential. Basically, data linking and the systematic inclusion of administrative data can contribute to the reduction of the statistical burden on respondents as well as the production of new information/new characteristics on the behavior of firms.

The results of case studies based on the connection of customs declarations with the BER on the one hand and of VAT data with BER on the other hand were presented in the document. The results in a nutshell:

- There is indeed a large potential for new products and new insights on the functioning of the Swiss economy. Customs data for example shed new light on the role of a handful of powerful enterprises that are very active in the manufacture of basic metals. Global trade figures are influenced by the behavior of these actors, and customs data is very useful to understand the various business models used by these firms. In this regard micro-data linking opens new options.
- Administrative data is very useful for the management of surveys. For example, it gives information which can complement data provided by respondents. It also gives precious inputs for the definition of the statistical unit (as opposed to the legal unit). Finally administrative data is very useful for small area estimations (SAE), where very granular information can be produced without increasing the size of the survey. The statistical system as such thus benefits from the inputs of administrative data warehouses.
- Characteristics of administrative data warehouses have implications on statistical uses. Customs data for example have a long tradition in statistics, while VAT data is produced mainly for fiscal purposes. This raises different challenges in terms of outputs, and there are still many open questions in this regard.

- It remains to be seen if administrative data can also contribute to a significant reduction of the burden on respondents. Positive signals come from the statistical system, as exemplified above with SAE. However, for the production of macro-economic figures like GDP, detailed information about the accounting results of firms still play a central role. In this context, VAT data could not replace data provided by the WV survey. Here VAT data is rather useful as an auxiliary variable, be it for specific branches or for the balancing process of the calculation of GDP.

The FSO intends to continue investigating the use of administrative data. For example, it will be very interesting to connect customs data to data on groups. Once this is done, one can see if the behavior of groups which are very active in international trade is different from units which are less integrated in the world economy. Given the importance of multinational enterprises in Switzerland and the position of the Swiss economy in global value chains, this will certainly provide interesting quantitative insight on the integration of the Swiss economy. Other areas will be investigated as well. This will enable the SFO to evaluate properly the potential of administrative data in a decentralized state like Switzerland.

Abbreviations

BER	Swiss business and enterprise register
BoP	Balance of Payments
CHF	Swiss francs
FATS	Statistics on the structure and activity of foreign affiliates
FCA	Federal Customs Administration
FSO	Federal Statistical Office
FTA	Federal Tax Administration
GDP	Gross Domestic Product
GVC	Global Value Chains
ITMS	International Merchandise Trade Statistics
NA	National Accounts
NACE	Statistical classification of economic activities in the European Community
NSI	National statistical institute
OECD	Organization for Economic Co-operation and Development
SAE	Small area estimates
SBS	Structural Business Statistics
SME	Small and Medium Enterprises
STS	Short term statistics
TEC	Trade by Enterprise Characteristics
TiVA	Trade in Value Added
UID	Unique enterprise Identifier
VAT	Value Added Tax
WV	Production and Value Added Statistics