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Bilateral Trade Asymmetries:
A Case Study of Switzerland

Why is there an important lack of accuracy in trade data?

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MANAGEMENT SUMMARY

The accuracy of international trade data can be rather questionable as in some cases large asymmetries in bilateral trade statistics result. Bilateral trade asymmetries are also referred to as mirror discrepancies and occur when the declared value of a country's imports does not correspond to the value of exports declared by its trading partner. Such mirror discrepancies are problematic because they jeopardize the quality of international merchandise trade statistics (IMTS) and thus lead to misreported bilateral deficits or surpluses, which in turn can motivate policy-makers to adopt ill-considered economic decisions. In order to improve the overall quality of IMTS, it is of utmost importance to understand the various factors that lead to mirror discrepancies.

This Bachelor's thesis gives an overview of the main concepts for the collection of trade data and analyzes the various causes of bilateral trade asymmetries. Furthermore, it conducts a case study on Switzerland's trade flows on the basis of the trade statistics from 2012 to 2016. The aim of the case study is to identify Switzerland's largest bilateral trade asymmetries over this 5-year period and to explain both the five most outstanding import and export asymmetries based on the discrepancy causing factors. The case study relies on data from the International Trade Center's Trade Competitiveness Map and the United Nation's Comtrade database. Moreover, the detailed explanations of Switzerland's bilateral trade discrepancies are based on an interview with an expert of the Swiss customs administration. All the required trading data as well as the transcribed interview can be found in the appendix.

The analysis has identified 12 different causes of bilateral trade asymmetries, which can be assigned to the following three categories: Discrepancies which occur despite a harmonized methodology, due to methodological differences, or due to malfunction in the collection system. The case study on Switzerland found that differences and errors in the recording of transshipments are the main cause of most of the largest mirror discrepancies, namely those with Singapore, the Netherlands, Spain, China and Nigeria. Other major discrepancies occurred from trade with Russia, Kazakhstan, and Israel, which have arisen in particular from trade in commodities. It is therefore likely that Switzerland's international commodity traders are involved in these transactions and thus it can be assumed that discrepancies are mainly caused by an incorrect declaration of trading partners.

The thesis recommends seven basic actions to improve the quality of IMTS and to reduce bilateral trade asymmetries. To reconcile discrepancies caused by transshipments and by the involvement of commodity traders it is recommended that exporters, importers, commodity traders and statistical authorities maintain close cooperation with each other and report the country of consignment as additional information. Since this study has identified transshipments as one of the main causes of discrepancies, future research could in particular explain how re-exports and re-imports affect IMTS.

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LIST OF ABBREVIATIONS

2008 SNA	System of National Accounts, 2008
ASYCUDA	Automated System for Customs Data
BPM6	The sixth edition of the Balance of Payments and International position Manual
CIF	Cost, Insurance and Freight
DOTS	Direction of Trade Statistics
EU	European Union
FOB	Free on Board
HS	Harmonized System
IMF	International Monetary Fund
IMTS	International Merchandise Trade Statistics
IMTS Manual	International Merchandise Trade Statistics: Compilers Manual, Rev. 1
IOT	Input-Output Table
ITC	International Trade Center
MENA	Middle East & North Africa
OCW	Open Customs Warehouse
OECD	Organization for Economic Co-operation and Development
SAD	Single Administrative Document
SITC	Standard International Trade Classification
TiVA	Trade in Value Added
UAE	United Arabic Emirates
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNSD	United Nations Statistics Division
WITS	World Integrated Trade Solution
WTO	World Trade Organization

1 INTRODUCTION

Since global trade is regarded as the main driver for economic growth, the participation of developing countries in these activities is becoming increasingly important (Guo, 2009). After the Second World War, the ongoing process of globalization has accelerated economic development in many countries through an enhanced flow of goods and services across national borders.

The volume of global exports in goods increased from $62bn in 1950 to $15,956bn in 2016 (statista.com, 2016). However, not only the volume of exports of goods has multiplied during the last couple of decades, but exports of services are also increasing in amount and importance. In 1970, the share of services exported amounted to approximately 9% of total goods and services exports. Since then, this number has more than doubled, amounting to over 20% (approximately $4,900bn) of total goods and services exports today (Loungani, Mishra, Papageorgiou, & Wang, 2017). Measuring trade in services is not only significantly more challenging but also less accurate than measuring trade in merchandise. In order to provide a meaningful analysis of trade data, this paper therefore only deals with trade in merchandise.

Besides fiscal revenue, foreign trade statistics are the oldest and most plentiful historical macroeconomic data sets. Already for rulers in the mercantilist economic system (16th to 18th century) who strived for a maximization of exports, the balance of foreign trade was an obsession (Federico & Tena-Junguito, 2016). Yet, the importance of accurate trade statistics still exists today, since they allow policy-makers to formulate and evaluate evidence-based economic policies. The availability of trade data is essential for a sustainable development of any economy. However, the data not only has to be available, but it also has to meet certain quality standards such as being consistent between countries and over time in order to be useful (Javorsek, 2016).

Bilateral merchandise trade statistics, also referred to as "mirror statistics", record the physical trade flow of goods between two countries. Ideally, the respective customs offices of both the exporting (Country A) and the importing (Country B) country should capture the trade flow in their export (Country A) or in their import (Country B) statistics. Despite of minor discrepancies due to small errors in the recording process and slight differences in the statistical methodology between the two statistical authorities, the value of Country A's recorded exports to Country B should be

similar to Country B's recorded imports from Country A. In reality, however, the two sides of the mirror statistics can often be very different (Hamanaka, 2011).

Asymmetries in bilateral trade statistics emerge due to various factors, which cause discrepancies in both the value and quantity of trade recorded. If statistical authorities of the trading partners record the same quantity at different values, then the asymmetry is limited to the price. Larger discrepancies in mirror statistics often only can be explained through customs offices which record at different quantities as well. Typical causes of such discrepancies are transshipments, human errors of statistical authorities, and the effects of smuggling by traders (Hamanaka, 2011).

In order to produce accurate statistics, an economy requires the appropriate administrative resources. It is therefore no surprise that trade statistics compiled by developing countries are even more affected by discrepancies (Hamanaka, 2011). Trade is often the major or even the only source of income for third world governments (Jerven, 2013). Since future spending plans are based on the country's trade statistics, it is essential that accurate records are available (Mackay, 1982). Asymmetries in trade data lead to wrongly reported bilateral deficits or surpluses, which motivate ill-informed national policies, such as, for example, an ineffective introduction of protective trade measures (Javorsek, 2016). It is important to mention that both developing countries as well as advanced economies are affected by discrepancies in mirror statistics.

This Bachelor's thesis provides a profound analysis of the factors which cause asymmetries in mirror statistics. It analyzes 136 bilateral trade flows (69 exports, 67 imports) between Switzerland and 77 different trading partners over a time period of five years. On the basis of the discrepancy causing factors, out of the 136 bilateral merchandise trade flows, the paper makes an attempt to explain both the five most outstanding export asymmetries as well as the five most outstanding import asymmetries between Switzerland and its respective trading partners.

The structure of this Bachelor's thesis is as follows. The theoretical framework in Chapter 2 explains the *Bilateral Trade Discrepancy Index* which is used to express mirror statistics discrepancies in the subsequent parts of this paper. While Chapter 3 introduces the main tools and organizations for collecting trade data, Chapter 4 presents various causes of discrepancies. The existing problem of mirror statistics discrepancies is shown on the basis of a case study on Switzerland in Chapter 5. It identifies

Switzerland's largest bilateral import and export asymmetries and attempts to explain some of the discrepancies based on the information provided in Chapter 4. To overcome the problem of unbalanced IMTS and improve the quality of trade data, Chapter 6 subsequently provides some practical ideas. Finally, the conclusion in Chapter 7 shows limitations of the thesis and gives recommendations for future research.

2   THEORETICAL FRAMEWORK

Bilateral merchandise trade flows between two countries are shown in the bilateral merchandise trade statistics. In a bilateral trade transaction, two parties are involved; the importing and the exporting country. Both, the importing and the exporting country report the respective trade value in their merchandise trade statistic. If the exporting country is the 'reporting country' (country reporting the merchandise flow), then the importing country is its 'partner country' (trading partner of reporting country) and vice versa. Therefore, every single trade transaction is recorded by two parties, the exporting and the importing country.

2.1 Bilateral Trade Discrepancy Index

By comparing the bilateral merchandise trade statistics of the exporting and importing country (mirror statistics), the recorded trade value should be identical. However, in fact, due to several factors which are explained in Chapter 4, the emergence of discrepancies in mirror statistics is impossible to avoid. In order to show the differences between mirror statistics, three different indices can be used (Guo, 2009). This paper makes use of the *Bilateral Trade Discrepancy Index*, which quantifies the degree of the discrepancy between 'Country B's reported imports from Country A' and 'Country A's reported exports to Country B'. Thereby, the value of the discrepancy is expressed as a proportion of the reported value of imports (Javorsek, 2016).

2.1.1 Formula

The *Bilateral Trade Discrepancy Index* is calculated with the following equation:

$$DIF_t^{AB} = \frac{M_t^{AB} - E_t^{AB}}{M_t^{AB}}$$

Where M_t^{AB} represents the value of imports reported by *B* from *A* (Country B = reporting country; Country A = partner country) at period *t*, while where E_t^{AB} represents the value of exports reported by *A* to *B* (Country A = reporting country; Country B = partner country) at the same period *t*. The flow of merchandise is determined by the order of the countries expressed as superscript letter. The country mentioned first (Country A in this case) is the consignor of merchandise while the country mentioned second (Country B in this case) is the recipient of merchandise.

Since bilateral trade flows consist of an exporting and importing country, the *Bilateral Trade Discrepancy Index* can be viewed from two different angles (Guo, 2009):

(1)   from the perspective of Country A as importing country $(DIF(I)_t^A)$ and Country B as exporting country $(DIF(E)_t^B)$

The first option reflects the difference between the imports reported by *A* from *B* (M_t^{BA}) at time *t*, and the exports reported by *B* to *A* (E_t^{BA}) at time *t*, as a percentage of imports reported by A from B.

$$DIF(I)_t^A = DIF(E)_t^B = \frac{M_t^{BA} - E_t^{BA}}{M_t^{BA}}$$

(2)   from the perspective of Country A as exporting country $(DIF(E)_t^A)$ and Country B as importing country $(DIF(I)_t^B)$

The second option expresses the difference between the imports reported by *B* from *A* (M_t^{AB}) at time *t*, and the exports reported from A to B (E_t^{AB}) at time *t*, as a percentage of imports reported by *B* from *A*.

$$DIF(E)_t^A = DIF(I)_t^B = \frac{M_t^{AB} - E_t^{AB}}{M_t^{AB}}$$

2.1.2 Interpretation

From the sign as well as the size of the *Bilateral Trade Discrepancy Index* some basic interpretations can be drawn. It not only helps its reader to uncover discrepancies amongst trading partners but also to get a general understanding whether particular countries involved in bilateral trade flows rather under- or over-report its exports and imports. However, in order to get a more detailed understanding of an existing discrepancy amongst two countries, one needs to profoundly analyze the underlying trade relationship. In the following part, the basic interpretations of the different signs of the *Bilateral Trade Discrepancy Index* are explained (Javorsek, 2016).

Positive $DIF(E)_t^A$:   In this case, the flow of goods is from Country A to Country B, while Country A's reported exports are smaller than Country

B's reported imports. Therefore, either A is under-reporting its exports to B or B is over-reporting its imports from A.

Negative $DIF(E)_t^A$: In this case, the flow of goods is from Country A to Country B, while Country A's reported exports are larger than Country B's reported imports. Therefore, either A is over-reporting its exports to B or B is under-reporting its imports from A.

Positive $DIF(I)_t^A$: In this case, the flow of goods is from Country B to Country A, while Country B's reported exports are smaller than Country A's reported imports. Therefore, either A is under-reporting its imports from B or B is over-reporting its exports to A.

Negative $DIF(I)_t^A$: In this case, the flow of goods is from Country B to Country A, while Country B's reported exports are larger than Country A's reported imports. Therefore, either A is under-reporting its imports from B or B is over-reporting its exports to A.

3   COLLECTION OF DATA

This chapter explains the basic concepts for the collection of merchandise trade data which are published in international merchandise trade statistics (IMTS). It shows how the data on physical movements of goods across borders is measured and presents the national authorities which are in charge of the collection of data. Moreover, it introduces the most important databases for IMTS which merge the data collected by national authorities and thus make it centrally accessible. Finally, it identifies problems associated with mirror statistic discrepancies.

As mentioned earlier in the introduction, this paper solely deals with trade in goods, as it is not only much more difficult but also less accurate to measure trade in services.

3.1 IMTS Manual

The "International Merchandise Trade Statistics: Compilers Manual, Rev. 1", referred to as IMTS Manual in the following, is a comprehensive methodological framework which was published by the United Nations (UN). It provides guidance for the collection and compilation of IMTS, aiming at a harmonized approach across all countries, regardless of the stage of development of their statistical system (United Nations, 2013).

The merchandise trade statistics are an important component of broader economic statistics such as the balance of payments or the national accounts compilation. Therefore, the IMTS Manual establishes crucial links to the respective frameworks governing these statistics, the BPM6[1] and the 2008 SNA[2]. While the IMTS are concerned with data on the physical movement of goods across national borders, the balance of payments and national accounts rather deal with the change of ownership of those goods (Javorsek, 2016). Therefore, the IMTS Manual describes the necessary adjustments of merchandise trade statistics in order to be useful for balance of payments and national accounts compilation purposes.

3.2 Measuring Trade Data

While the IMTS Manual solely serves as the UN's recommendation for the collection and compilation of trade statistics, the actual recording of IMTS depends on national legislation, mainly national customs law. Importers and exporters of

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[1] BPM6: The sixth edition of the Balance of Payments and International Position Manual
[2] 2008 SNA: System of National Accounts, 2008

merchandise are obligated to report every commercial transaction to customs for tax and duty collection, health and environmental control, and statistical purposes (United Nations, 2013, p. 3). In practice, however, the customs documents are usually completed by freight forwarders on behalf of importers and exporters before they are sent to the respective customs offices (Appendix Z, Q1).

The main national organizations involved in the production of IMTS are statistical offices, customs authorities and central banks, and in certain countries specialized public or private bodies such as the ministry of trade for example (United Nations, 2013, p. 4). While the main source for merchandise trade statistics are customs declarations, developed economies with advanced statistical systems also exploit additional sources such as enterprise surveys or administrative records associated with taxation (United Nations, 2013, p. 7). However, this diversity of source use can lead to discrepancies in the definition of trade, partners, and the valuation of traded goods (Javorsek, 2016).

The completed customs declarations are sent in printed or, more often, electronic form to the national organization responsible for compilation. Thereby, the computerized system, ASYCUDA[3], developed by the United Nations Conference on Trade and Development (UNCTAD), facilitates the electronic submission and processing of trade data. The basis for customs declarations in the European Union (EU), Iceland, Norway and Switzerland is the single administrative document (SAD) which is depicted in Appendix A (United Nations, 2013, p. 20).

For the proper completion of such customs declarations as for example the SAD, some specialized knowledge is required. Therefore, national customs authorities usually not only provide detailed instructions but also conduct training for both their own staff as well as for the parties reporting trade (United Nations, 2013, p. 18). According to the interview with the Federal Customs Authority (Appendix Z, Q1-3), it is essential that SADs contain the indication of the exporting and importing country, the merchandise with the corresponding Harmonized System (HS) code or the Standard International Trade Classification (SITC) code, as well as the quantity and value of the goods traded. HS and SITC codes are used to classify goods by type, allowing later comparison of international trade statistics as they are applied across countries

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[3] ASYCUDA: Automated System for Customs Data

Since commodity coding systems such as the HS and SITC play an important role in achieving a harmonized approach in the compilation of IMTS, the following part explains them in more detail.

3.3 Trade Statistics Coding Systems

For the organization of IMTS the business community uses numerical coding systems which were developed by the UN. With the HS and the SITC there are two main systems in use today. Even though the systems use different classification codes, conversion tables allow HS data to be translated into SITC data and vice versa. The degree of specificity of the commodity depends for both systems on the length of the digit string. While 1- or 2-digit numbers portray highly aggregated data for wide product categories, long strings represent fairly specific commodities (United Nations, 2010).

3.3.1 The Harmonized System

Since the introduction of the HS in 1988, it has been adopted by most of the countries. In its 30 years of existence, the HS has undergone five revisions which came into force in 1996, 2002, 2007, 2012, and 2017. The coding system consists of a 6-digit string which is identical for each country. After the 6th digit number, however, each country is free to further sub classify its articles up to a string of 10-digits. The longer the digit string, the finer the division of the respective product group and the more specifically the goods are classified (United Nations, 2017). While Switzerland applies for their product classification an 8-digit string, for example, Germany sub divides products using a 10-digit string, which can explain certain reporting discrepancies between countries at detailed product level (Appendix Z, Q5).

The latest edition, HS2017, comprises approximately 5,300 article descriptions specified by the 6-digit string. The string consists of three parts; while the first two digits (HS-2) represent the chapter the articles are classified in (e.g. 09 = Coffee, Tea, Maté and Spices), digit 3-4 (HS-4) identifies groupings within that chapter (e.g. 09.02 = Tea, flavored or not flavored). Finally, the last two digits, 5-6 (HS-6), specify the product within the grouping of that chapter (e.g. 09.02.10 = Green tea) (United Nations, 2017).

3.3.2 The Standard International Trade Classification

The other main coding system besides the HS is the SITC, which tends to be less detailed as it solely classifies products up to a 5-digit level. Just as the HS, also the

SITC has been revised several times since its introduction in 1950 (United Nations, 2006). The most current version is the SITC Rev. 4 which applies a similar methodology as the HS. The first digit reflects aggregated data of product chapters (e.g. 1 = Beverages and tobacco), whereas the following digits break the chapters down to divisions within the chapters (e.g. 11 = Beverages), groupings (e.g. 111 = Non-alcoholic beverages), sub-groupings (e.g. 111.0 = Non-alcoholic beverages), and detailed products (e.g. 111.01 = Waters, including natural or artificial mineral waters) (United Nations, 2018a).

3.4 IMTS Databases

As mentioned earlier, data of every transaction is continuously transmitted to customs authorities and is thus collected on an ongoing basis. While customs authorities verify the goods of a few conspicuous transactions directly at the border, most of the data is processed for tax and duty collection usually without any physical control of the merchandise concerned. The national statistical authority subsequently compiles the IMTS, which are expressed in the official currency of the respective country, on the basis of the transmitted transactions. While the data collected is provisionally published in the monthly trade statistics, the official statistics of a certain year is, in Switzerland for example, only published 14 months after the end of this particular year. During these 14 months it is attempted to uncover and rectify any reporting errors by taking consultation with the respective companies reporting the transactions (Appendix Z, Q6).

Once the official trade statistics of various nations were released for publication, international organizations obtain the respective data to integrate it into their central IMTS databases. Most of the countries publish their trade statistics in their official currency, whereas central IMTS databases express the values in US dollars (Appendix Z, Q7). Therefore, international organizations convert national trade data to US dollars by using the exchange rates supplied by the reporting countries, or, more commonly, by using a monthly average of the respective market rates (Hamanaka, 2011, p. 2). The values published in the various databases may vary depending on the exchange rate used.

Several global databases for IMTS exist, such as for example the World Bank's Integrated Trade Solution (WITS)[4], the OECD's Bilateral Trade Database[5], the IMF's

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[4] https://wits.worldbank.org/
[5] https://stats.oecd.org/Index.aspx?DataSetCode=BTDIXE

Direction of Trade Statistics (DOTS)[6], or the EU's Eurostat[7]. The analysis of Switzerland's bilateral trade flows in Chapter 5, however, is based on data from the United Nations Statistic Division's (UNSD) UN Comtrade[8] as well as from the International Trade Center's (ITC) Competitiveness Map[9]. Therefore, these two databases are explained in more detail in the following part.

3.4.1 UN Comtrade Database

With over three billion data records since 1962 and over 170 reporting countries providing the highest statistical authority, the UNSD, with their annual trade statistics, UN Comtrade is the largest depository of international trade data. As countries generally show all values in local currency, the UNSD converts them into US dollars using the exchange rates supplied by the reporting countries or derived from the monthly market rates. While most of the countries report their merchandise classification according to the HS2012, the UNSD converts the data and additionally provides it according to the SITC classification (United Nations, 2016a).

The analysis of Switzerland's five most outstanding export (Part 5.5.1-5.5.6) and import (Part 5.6.1-5.6.5) discrepancies in Chapter 5 is based on UN Comtrade data. In the analysis of both import and export discrepancies, the paper attempts to break the discrepancies down to the product categories, from which they accrued. Thereby, the division of commodity chapters was undertaken according to the SITC (Appendix P-Y).

3.4.2 Trade Competitiveness Map

The Trade Competitiveness Map, which was developed by the ITC, is based on the largest database of trade statistics, UN Comtrade. If for a certain country the statistical data is not available, however, the Trade Competitiveness Map uses mirror statistics values. If Country A exports goods to Country B and Country B does not report any trade to the UN Comtrade database, for example, the Trade Competitiveness would use Country A's export value to indicate Country B's imports. Therefore, various non-reporting countries can additionally be covered with this approach. However, since the Trade Competitiveness Map uses this additional source of information, its data may slightly differ from the data published in the UN Comtrade database (International Trade Center, 2014).

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[6] http://data.imf.org/?sk=9D6028D4-F14A-464C-A2F2-59B2CD424B85
[7] http://ec.europa.eu/eurostat/home
[8] https://comtrade.un.org/
[9] https://tradecompetitivenessmap.intracen.org/tpic.aspx

In this paper the Trade Competitiveness Map is used to identify the discrepancies between the reported values of Switzerland and its trading partners (Appendix B-O). Thus, both the ten largest export (Part 5.5) and the ten largest import (Part 5.6) discrepancies can be determined, which serve as a basis for the subsequent selection of trade relationships to be analyzed in detail. The selection process of these trade relationships is therefore mainly based on the Trade Competitiveness Map, whereas the detailed analysis of the selected trade relationships is based on UN Comtrade data.

3.5 Problems of Mirror Statistics Discrepancies

By comparing the in IMTS databases published export and import values of different nations with each other, the existence of mirror statistics discrepancies becomes evident. To show an example of such a discrepancy, Switzerland's reported export value to Germany are compared with Germany's reported import value from Switzerland, which in fact should be identical, since it is the same flow of goods. However, in 2016, Switzerland has reported exports to Germany only amounting to $43.7bn, whereas Germany has reported imports from Switzerland worth $49.6bn. Therefore, the mirror statistics discrepancy in this example amounts to $5.9bn, which corresponds to a $DIF(E)^{Switzerland}$ of 11.96%, and thus is relatively small compared to other bilateral trade asymmetries (Appendix D).

Mirror statistics discrepancies arise for various reasons (Chapter 4) and among all nations. Since these reporting differences can be significant, IMTS databases often lack internal consistency and quality. Moreover, it is extremely difficult for international organizations to improve the quality of IMTS databases, since they cannot know which reported value, if any, is the correct one. These inconsistencies are a particular problem for trade analysts and researchers as they require data on bilateral trade flows for analytical purposes and therefore use IMTS databases as their main source. An example for which researchers need balanced bilateral trade statistics is the preparation of international input-output tables (IOTs)[10] which are in turn required to estimate Trade in Value Added (TiVA) (Javorsek, 2016). TiVA is a particular concept of measuring trade. Thereby, only the value added at each stage of production is measured in order to avoid double counting (Camacho & Javorsek, 2015). This analysis

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[10] IOTs are concerned with the description of "sale and purchase relationships between producers and consumers within an economy" (OECD, 2018). They allow to not only understand the interaction between domestic industries but also the structure of imports in a certain economy (Girard, Javorsek, & Santoro, 2015).

already requires many assumptions and therefore is its quality, without consistent and reliable input data, i.e. bilateral trade flows, even more questionable (Javorsek, 2016).

In addition to analysts and researchers, bilateral trade asymmetries also pose a problem for national policy makers (Guo, 2009). Inaccurate trade data and its corresponding deficits or surpluses may motivate ill-conceived economic policies, such as the introduction of protective trade measures, which in fact would not be necessary (Javorsek, 2016). Inefficient economic policies would certainly negatively affect the respective economy, which is why accurate and consistent trade data is essential. In order to provide a basis for the analysis of specific mirror statistics discrepancies in Chapter 5, possible factors that may lead to bilateral trade asymmetries are described in the following section.

4   CAUSES OF DISCREPANCIES

In theory, in a bilateral trade flow, the export statistic of a particular country should reflect the mirror image of the import statistic of its partner country. However, as mentioned earlier, various factors cause in some instances severe asymmetries in mirror statistics. Among other authors Mark Ghelhar (1996) has proposed, that a divergence in mirror statistics of less than twenty per cent is small enough to be considered as accurate since certain differences are unavoidable.

This chapter addresses the numerous causes of asymmetries in mirror statistics. Federico and Tena (1991) have grouped in their working paper "On the Accuracy of Trade Statistics" the causes of divergence under three headings; "Unavoidable" differences, "Structural" differences, and actual errors. In order to obtain a clear structure, this paper classifies the various causes into the following three categories:

1. Discrepancies occurring in spite of a harmonized methodology
2. Discrepancies attributed to differences in the methodology
3. Discrepancies due to malpractice/malfunction in the collection systems

4.1 Discrepancies Occurring in Spite of Harmonized Methodology

The following part deals with causes of asymmetries that emerge even if the statistical authorities of both trading partners apply the same methodology. These causes typically account for limited divergences, however, are due to their characteristics difficult to avoid.

4.1.1 Valuation of Imports and Exports (CIF vs. FOB)

The international methodology, which is specified in the IMTS Manual, recommends for the compilation of statistics the use of valuation methods based on the "WTO Agreement on Valuation". Article 8, paragraph 2, of the 'WTO Agreement on Valuation' states that "exports should be assessed under FOB ('free on board') conditions, whereas imports should be expressed in CIF ('cost, insurance and freight') value" (WTO, 1994).

While the for exports suggested FOB valuation comprises (a) "the transaction value of the goods", and (b) "the total value of services performed to deliver the goods to the border of the exporting country", the for imports recommended CIF valuation includes, in addition to (a) and (b), (c) "the total value of services performed to deliver the goods from the border of the exporting country to the border of the importing

country" (United Nations, 2013, p. 149). Therefore, the CIF/FOB valuation causes a discrepancy of an amount equal to shipping and insurance costs between the reported export and import values (Day, 2015).

In order to make the import and export values comparable, the IMTS Manual encourages countries to compile FOB-type value of imported goods as supplementary information, so that the import values can be adjusted to an FOB basis (United Nations, 2013, p. 149). For the reconciliation process of some of the discrepancies in mirror statistics, this supplementary information would be essential. However, unfortunately, up to date, only a few countries, such as Australia for example, provide international organizations with FOB values for both import and export figures (Javorsek, 2016).

It is clear that insurance and freight charges vary depending on the type of goods, the mode and the distance of transportation (Eurostat, 2009). The historical belief exists that the difference between the importer's reported CIF value and the exporter's reported FOB value amounts on average to around 10%. The process leading to this result of a 1.10 'rule of thumb' conversion is explained in the introduction to the IMF Direction of Trade Statistics Yearbook published in 1981 (Mackay, 1982). However, according to Euan A. Mackay (1982) there is little empirical support to believe that CIF-FOB ratios are on average 1.10.

Researchers and academics disagree with each other about the size of CIF-FOB ratios. Therefore, this paper shows different results of numerous working papers in order to draw a plausible conclusion. By using UN Comtrade data, several academics calculated a trade-weighted average CIF-FOB margin. Ghelhar (1996) arrived at a global average CIF-FOB margin of 4%, and was herewith among the first researchers to make such a CIF-FOB estimation on a large scale. While Gaulier and Zignago (2010) estimated the margin to be around 3% Trimmer et al. (2012) established global average CIF-FOB margins between 5% and 7%. The most recent study published by the OECD estimates a global trade-weighted average CIF-FOB margin of 6.2% across the period of 1995 to 2014 (Miao & Fortanier, 2017).

The different studies about CIF-FOB margins suggest that the historical assumption of insurance and transport cost being at around 10% is rather slightly overvalued. Due to the fact that the impact of CIF/FOB valuations on mirror statistic asymmetries is relatively contained, further causes of discrepancies will be analyzed.

4.1.2 Time Lags

In addition to transportation costs also transportation times can cause discrepancies in mirror statistics. In international trade, exports are recorded when goods leave the economic territory of the compiling country, and imports when they enter. Thus, there is a gap between the recording of exports and the recording of imports which equals the time of shipment (Day, 2015). Especially in the cases of cross-continental trade, where the shipping times are longer, the same transactions can be recorded under a different reference period. Time lags occurring from transportation times between the recordings of trade are therefore particularly applicable to asymmetries in monthly data and typically only lead to minor deviations (Javorsek, 2016).

However, not only transportation times can lead to discrepancies due to delays in recording imports and exports, but also the storage of certain goods in open customs warehouses (OCWs). OCWs are typically used for duty-free interim storage (from 1 month to several years) of valuable items such as gold or artifacts. Although OCWs exist in most countries, they are not part of the statistical territory of the country in which they are located. For example, if a particular product that was in Country A is transferred to an OCW (in Country A), where it is put into interim storage for 3 years before being exported to Country B, a delay of 3 years occurs between the registration of the export and the import. I.e. Country A records an export to Country B in year X, whereas Country B reports the import from Country A only in year X+3. Therefore, time lags can also cause discrepancies in annual data, especially in the case of storage in OCWs (Appendix Z, Q14).

4.1.3 Currency Conversion

As mentioned in Part 4.1.2, time lags of customs procedures in exporting and importing countries cause discrepancies in mirror statistics. Additionally, the reported value of goods can be affected by fluctuations in exchange rates (Eurostat, 2009). Article 9, paragraph 2, of the 'WTO Agreement on Valuation' states that "the conversion rate to be used shall be that in effect at the time of exportation or the time of importation […]" (WTO, 1994). Hence, variations in the exchange rate between the time of exportation and the time of importation can result in discrepancies in mirror statistics.

Another cause of asymmetries in mirror statistics is that national statistical authorities often fail to properly record exchange rate fluctuations. Trade values are usually aggregated over the period of one year in local currency, before they are reported to international institutions such as the UNSD. In order to compare the export and import values of global trade, the reported values are then converted into US dollars by applying a monthly average rate. Without the availability of exact exchange rates this can result in inaccurate data and hence asymmetries in mirror statistics (International Trade Center, 2014).

4.2 Discrepancies Attributed to Differences in the Methodology

Causes addressed in the following part can be ascribed to the application of different methodologies by statistical authorities between trading partners. They often amount to a substantial part of discrepancies between mirror statistics.

4.2.1 Different Trade Systems (General vs. Special)

Another common cause of asymmetries in international trade statistics is the application of two different trade systems, the general and the special. A country's trading system can be described as general or specific, depending on which parts of the economic territory are included in the statistical territory (Markhonko, 2014). The IMTS Manual defines the statistical territory of a country as "the territory with respect to which trade data are being compiled" (United Nations, 2013, p. 55).

If a country's statistical territory coincides with its economic territory, then the general trade system is adopted (United Nations, 2013, p. 55). Under the general trade system, all goods which enter/leave the economic territory of a compiling country are included in its import/export statistics (Eurostat, 2009). On the other hand, the special trade system is in use when some parts of the economic territory are excluded from the statistical territory, i.e. particular flows of merchandise are not included in either import or export statistics of the compiling country (Markhonko, 2014).

Since not all goods which are in the scope of international merchandise trade are covered when using the special trade system, the IMTS Manual recommends countries to adopt the general trade system. However, in some cases, such as in trade free zones (e.g. EU), the general trade system is not feasible, because there is no customs recording in particular parts of the economic territory (Javorsek, 2016). Therefore, different trade systems between countries are still in use which can lead to discrepancies in mirror

statistics, since the application of the special trade system narrows the coverage of the statistics.

4.2.2 Different Attribution of Trade Partners

Even though the UN recommends in the IMTS Manual a consistent way for partner country attribution, statistical authorities use different methods for the compilation of trade statistics. This methodological difference reflects one of the biggest causes of asymmetries in mirror statistics (Javorsek, 2016).

While the IMTS Manual recommends for imports to record the *country of origin* (nation where the goods have been produced), it suggests for exports to record the *country of last known destination* (the last nation where goods are to be delivered, as far as this is known at the time of exportation) (United Nations, 2013, p. 101). However, the IMTS Manual recognizes in paragraph 6.22 that there are restrictions on the use of data generated on the basis of the *country of origin*, as it is not possible for the same transaction to be recorded symmetrically by the trading partners (Markhonko, 2014).

In order to overcome the statistical difference, the IMTS Manual suggests countries, in addition to the recording of *country of origin* for imports and the *country of last known destination* for exports, to record the *country of consignment* for both imports and exports (United Nations, 2013, p. 185). It is assumed that a strict implementation of this measure would show a substantial decrease in observed asymmetries among trade statistics (Markhonko, 2014). Countries, however, have solely a considerable interest in attributing the correct *country of origin* (and not the *country of consignment*) for their imports, since the customs duty attribution is based upon this allocation. The additional administrative costs for recording the *country of consignment* are amongst other things the reason why only a few countries follow the recommendations of the UN yet (Javorsek, 2016).

4.2.3 Different Recording of Re-Exports

As mentioned in Part 4.2.2, differences in attributing trade partners is a major cause of asymmetries in mirror statistics. Especially in the case of re-exports, a homogenous attribution of trade partners is crucial to avoid discrepancies in merchandise trade statistics.

Re-exports, also referred to as transshipments, occur when merchandise is shipped to the customs territory of a particular country (Country A) and subsequently to

another country (Country B) without being substantially transformed during the process (Guo, Webb, & Yamano, 2009). Country A, in this example, is the so-called trade hub where the goods are shipped via before reaching their final destination (Country B). Several countries such as Belgium, Hong Kong, the Netherlands and Singapore have large ports and are due to their favorable geographical location well-known as trade hubs (Guo, 2009). If a product is shipped to the Asian market, for example, it is likely that it is transported via the ports of Hong Kong or Singapore before it is re-exported to its final destination. It should be noted that the largest part (approx. 90%) of the world trade in goods is the responsibility of the international shipping industry and is therefore transported by sea (International Chamber of Shipping, 2016). Due to the differences across countries in the trade partner attribution (Part 4.2.2), trade hubs are usually particularly affected by discrepancies in mirror statistics, since their total volume of trade often exceeds the actual value of domestically-produced goods (Guo, 2009).

On the basis of the mostly examined example of asymmetries in mirror statistics, the one between China and the United States, it is shown how shipments via Hong Kong can affect the trade statistics, given a different trade partner attribution. Assume a product export to the value of $10m from China to the United States via Hong Kong. For the recording of this relatively simple and common transaction there are four different outcomes with widely varying IMTS flows (Guo, 2009):

1) *China records the United States as last destination for its exports, while the United States record China as country of origin for its imports.*

   Due to the correct trade partner attribution of China and the United States, the first outcome would not result in a mirror statistics asymmetry between China and the United States.

2) *China records the United States as last destination for its exports, while the United States wrongly record Hong Kong as country of origin for its imports.*

   Due to the wrong trade partner attribution of the United States, the second outcome would induce a mirror statistics asymmetry of $10m between China and the United States.

3) *China wrongly records Hong Kong as last destination for its exports, while the United States record China as country of origin for its imports.*

Due to the wrong trade partner attribution of China, the third outcome would induce a mirror statistics asymmetry of $10m between China and the United States.

4) *China wrongly records Hong Kong as last destination for its exports, while the United States wrongly record Hong Kong as country of origin for its imports.*

Due to the wrong trade partner attribution of China and the United States, the fourth outcome would induce a mirror statistics asymmetry of $20m between China and the United States.

This particular example only dealt with mirror statistics discrepancies between China and the United States. Depending on Hong Kong's trade partner attribution, further discrepancies either between the mirror statistics of Hong Kong and China or between Hong Kong and the United States could emerge.

As shown with the example above, asymmetries due to re-exports primarily emerge because of differences in the partner country attribution. However, there are two further factors of re-exports which cause asymmetries in mirror statistics. Firstly, different practices of recording re-exports among countries can result in asymmetries, since certain economies do not include re-exports into their export statistics. Secondly, in the case of a correct identification of origin and destination by each country, the recorded value of a transaction may differ due to the application of a significant mark-up (via branding, re-packaging, etc.) by the re-exporting economy (Day, 2015).

In order to reconcile the asymmetries caused by re-exports, the IMTS Manual recommends including re-exports into the export statistics, while additionally disclosing them separately for statistical purposes. However, in practice, it is difficult for countries to record re-exports separately, which is why only a few countries comply with the UN's recommendation (Javorsek, 2016).

4.2.4 Different Thresholds for Recording Trade

Certain customs territories defined different thresholds for recording international trade data, which may be a further methodological cause of asymmetries in mirror statistics (Javorsek, 2016). A good example is the EU, which stipulates that

extra-EU trade (between Member State and Non-Member State) below €1,000 or 1,000 kg in net mass does not have to be reported. The threshold for intra-EU trade (between two Member States) currently amounts to €200 (Eurostat, 2018).

4.2.5 Different Product Classifications

Part 3.3 describes different numerical coding systems in use, which aim to classify the commodities on a common basis for customs purposes. Thereby, the degree of specification of the classified goods varies depending on the length of the string of digits (United Nations, 2010). Hence, if statistical authorities make use of different versions of the nomenclature for the classification of products (e.g. HS2007 vs. HS2017) discrepancies can arise. However, mirror differences caused by different versions of coding systems mainly arise in trade data at detailed level, i.e. by product line (Javorsek, 2016).

Various factors such as environmental concerns, ongoing trade negotiations or technological developments require continuous revisions to existing coding systems. Thereby, additional codes are assigned to certain commodities and more explicit details in the classification of goods are expected (Lindner, Cave, Deloumeaux, & Magdeleine, 2001). Due to the higher complexity in the classification of goods, it is becoming increasingly difficult for companies to classify their goods correctly, leading to further mirror differences at detailed level (Eurostat, 2009). By using the same versions of coding systems across countries, however, these discrepancies could certainly be limited.

4.3 Discrepancies Due to Malpractice/Malfunction in the Collection Systems

The discrepancy causing factors dealt with in the following part were categorized as dysfunctions in the collection systems. They mainly arise through misbehavior or errors of any of the parties involved in the trading process, such as the exporting and importing entity or the customs agencies.

4.3.1 Smuggling and Non-Reporting

The illegal transportation of goods across borders, also referred to as smuggling, represents especially in poorly policed areas a serious problem (International Trade Center, 2014). Unrecorded trade usually affects the import of completely banned commodities or goods with high customs duties, since tariffs are imposed upon imported goods. It therefore causes an underestimation of the import volume but not

necessarily of the export volume, hence, discrepancies in mirror statistics arise (Federico & Tena, 1991).

4.3.2 Misreporting Due to Fraud

A further potential cause for asymmetries in mirror statistics is the trading entity's misreporting of the origin, destination, type, or value of merchandise to the statistical authority (Day, 2015). Misreporting can occur intentionally (fraud) or accidentally (negligence), with the main focus in this part being on intentional misreporting. Trade entities have different incentives for misreporting trade transactions, including circumvention of quotas or embargos, tax and duty minimization, and evasion of capital controls (Day, 2015). Common fraudulent practices applied to benefit from these advantages are the intentional misattribution of trading partners or misinvoicing (Shaar, 2017).

The most common form of import tariff is the ad valorem tariff, where customs duties are calculated as a percentage of the invoiced merchandise value (World Bank, 2010). For reasons of duty minimization or evasion, trade entities have therefore an obvious interest in under-invoicing, i.e. declaring values below the real values (Federico & Tena, 1991). However, also the fraudulent practice of over-invoicing exists, thus declaring the values above the real ones, in order to take advantage of certain export support schemes (Shaar, 2017).

Javorcik and Narcisio (2008) have investigated ten bilateral trade relationships between Germany and Eastern European countries. It was found that in eight out of the ten countries examined, the size of discrepancy is positively correlated to the level of tariff. Their working paper shows that misinvoicing is an actual practice which is applied by certain trade entities.

4.3.3 Errors in Collection System of Statistical Authorities

Errors in the collection system of customs authorities can cause discrepancies in mirror statistics. They may creep in either during the recording process of the declaring companies or during the subsequent processing of data at statistical authorities. However, due to the increasing computerization of customs declarations, the risk of emerging errors should gradually be limited (Eurostat, 2009).

According to Federico and Tena (1991), the estimation of official values was one of the most serious errors that have been committed. If in one year no data was

available, statistical offices used to update the estimated values, resulting in an over-valuation in times of decreasing prices and under-valuation in times of increasing ones.

4.3.4 Unallocated Trade Data and Specific Goods Not Followed Properly

Unallocated trade data may be a further source of discrepancies in mirror statistics. Transactions which statistical authorities report to international organizations by using special codes are referred to as unallocated trade data. Thereby, due to confidentiality reasons, statistical agencies waive an allocation of merchandise to a particular trade partner and/or to a specific product code (Javorsek, 2016). If the reporting country for example trades with a partner under an international embargo, the transaction could be reported under the code 'Other Areas n.e.s.[11]'. For the export of goods which a country is not willing to disclose (e.g. military equipment), the statistical agency could use the HS code 99, which stands for 'Commodities not specified according to kind' (Guo, Webb, & Yamano, 2009). If the country's trading partner nevertheless reports the transaction differently (provide information about particular trade partner / product code), it will result in a discrepancy in their mirror statistics

Another source of discrepancies caused by customs agencies may be negligence of the rules on goods. According to the statistical office of the EU, Eurostat (2009), certain customs administrations might not properly follow some specific goods such as for example maritime products, electricity, ships, aircraft, etc., which could lead to a different statistical treatment.

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[11] n.e.s. = not elsewhere specified

5 CASE STUDY SWITZERLAND

The following part of this paper analyzes several bilateral trade flows of Switzerland and its trading partners, in order to show the underlying problem of mirror statistics discrepancies. The choice of Switzerland as country of study was made due to its strong position as global exporter. In 2016, Switzerland ranked with a total export value of $303bn 15th in the list of the most important exporters. While Swiss exports accounted for 2% of global trade, the population of the country was only 0.1% of the world's population. China's population, for example, accounted for 20% of the world's population, while its exports accounted for 12% of world trade (Bertschinger, 2017). Even though China was the most important exporter in 2016, also Switzerland is an important player in the world trade market, especially in view of its relatively small population. Further reasons for the choice of Switzerland are the personal interest of the author and the possibility of selecting suitable interview partners, which can facilitate the identification of causes for the existence of statistical asymmetries. Trade data required for the analysis has been extracted from the ITC's Trade Competitiveness Map (Part 3.4.2), which is based on the world's largest trade statistics database, UN Comtrade (Part 3.4.1).

5.1 Information about Switzerland

In order to provide a basis for the following analysis of bilateral trade asymmetries (Parts 5.5 & 5.6), this section briefly presents both Switzerland's approach to trade recording and Switzerland's different practices in comparison with the international business world.

5.1.1 Reporting Currency

As described in Part 3.4, most countries record trade statistics in their official currency. Since also Switzerland reports its statistics in Swiss francs, bilateral trade asymmetries may occur due to the application of different exchange rates as described in Part 4.1.3 (United Nations, 2016b).

5.1.2 Import and Export Valuation

Another discrepancy causing factor is the different valuation of imports and exports explained in Chapter 4.1.1. As most of the countries, also Switzerland values imports on the CIF basis and exports on the FOB basis which can generally lead to minor mirror discrepancies of less than 10% (United Nations, 2016b).

5.1.3 Trade System

As described in Part 4.2.1, also the adaptation of different trade systems may cause bilateral trade asymmetries. While most countries apply the general trade system, Switzerland applies the special one, which can lead to certain discrepancies, especially with countries that apply the general trade system (United Nations, 2016b).

5.1.4 Partner Country Attribution

A different approach of attributing trade partners among countries also causes asymmetries in mirror statistics (Part 4.2.2). As recommended in the IMTS Manual, Switzerland uses the *country of origin* for the allocation of imports and the *country of last known destination* for exports. However, Switzerland does not report the *country of consignment*, which the IMTS manual additionally recommends to overcome certain discrepancies (United Nations, 2016b).

5.1.5 Open Customs Warehouses

Time lags between reporting imports and exports are another problem causing mirror statistics discrepancies. As described in Part 4.1.2, the OCWs, in which valuable goods such as gold or artifacts are stored temporarily, play an important role for those time lags. As of January 2018, there were 667 private OCWs, which are located all over Switzerland and controlled by an assigned customs office. All warehouse keepers are obliged to keep stock records of the stored goods, which have to be approved by the respective customs office. Although the volume in the OCWs is not published, it can be assumed that due to the number of warehouses this represents a considerable amount (Eidgenössische Zollverwaltung, 2018). It can therefore be assumed that some of the bilateral trade asymmetries can be explained by the time delays in trade capture due to the storage of goods in OCWs. (Appendix Z, Q14).

5.1.6 Particularity of Switzerland – Specific Tax

According to the Federal Customs Administration, one thing that differentiates the Swiss methodology from the international standard is that Switzerland is one of a few countries which charges taxes on quantities (specific tax) rather than values (ad valorem tax). However, this does not affect bilateral trade asymmetries, as the statistical value contains neither duties nor taxes (Appendix Z, Q3).

5.2 Selection Criterion Partner Countries

The relevant criterion for the selection of Switzerland's partner countries was based on the volume of trade in 2016. Thereby, all countries for which Switzerland has

reported a minimum export- or import-value of $100m in 2016 were examined. After identifying the partner countries matching the criterion, the analysis was performed with trade data over a time period of five years, from 2012 to 2016.

Using the above criterion, 69 countries (Appendix B) into which Switzerland exports goods were selected for analysis. On the other hand, a total number of 67 countries (Appendix C) from which Swiss imports originate were identified. Therefore, 136 bilateral trade flows (69 exports and 67 imports) with 77 different countries over a time period of 5 years were analyzed.

5.3 Analysis of discrepancies per region

The selected partner countries have been assigned to six different geographical regions, corresponding to the well-known economic areas[12]. The following section presents each economic area by showing the number of countries making up each region, the discrepancy at aggregated level[13], as well as the countries accountable for the largest discrepancies. Even though the aggregated discrepancy at region level is rather insignificant (explanation in Part 5.4 on p. 29), the breakdown by region has been made in order to present the trade data for each country clearly structured in the appendix (Appendices D-O).

Each region is considered from two perspectives: firstly, from Switzerland's perspective as an exporter and secondly, from Switzerland's perspective as an importer. All trade values provided in the following part are added over a period of five years (2012-2016).

5.3.1 Europe

As far as Swiss exports are concerned, a total number of 29 countries have been allocated to the European region. While Switzerland has reported exports amounting to $747.5bn to these 29 trading partners, they have only reported an import amount of $698.2bn from Switzerland. This corresponds to an aggregated discrepancy of $-49.3bn, which equals a percentage difference of -7.06%, using European imports from Switzerland as base. The biggest discrepancies within Europe resulted from trade activities with Spain (-63.73%) and the Netherlands (-73.10%) (Appendix D).

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[12] Europe, Middle East & North Africa (MENA), Sub-Saharan Africa, Asia Pacific, Latin America, North America
[13] Discrepancy between Switzerland's reported trade values and accumulated trade values of all selected countries of the region

In terms of imports from the European region, 28 countries have been considered for the analysis. Switzerland has reported a total import amount of $934.8bn, whereas the mirror value of the European reporting partners amounts to $966.4bn. Therefore, the discrepancy equals $-31.5bn (-3.37%). The largest discrepancies of European trading partners resulted from imports from Russia (-96.01%) and Finland (40.19%) (Appendix E).

5.3.2 MENA

Compared to Europe, in terms of its trading volume is the MENA region clearly less significant for Switzerland. Nevertheless, eleven trading partners[14] of the MENA region have been included in the analysis of Swiss exports. While Switzerland reported for its exports only an amount of $47.5bn, their MENA trading partners have reported a value of $60.6bn. By using the import value reported by the selected MENA countries as base, this equals a positive percentage discrepancy of 21.68% ($13.1bn in absolute terms). Over the five years' time period, Switzerland has therefore either under-reported their exports to the MENA region or their respective trading partners in the MENA region have over-reported their imports. The largest discrepancies of reported values can be traced back to Israel (74.15%) and Lebanon (-25.30%) (Appendix F).

For Switzerland's imports from the MENA region, only six countries[14] were included in the analysis. These six countries have reported a total export value to Switzerland of $42.8bn, whereas Switzerland has only reported $36.6 bn. The aggregated reporting discrepancy therefore amounts to $-6.2bn, which equals -16.90% by using Swiss imports as base. Just as for Swiss exports, trade activities with Israel (-109.12%) and Lebanon (53.05%) were responsible for the largest discrepancies for Swiss imports amongst all selected MENA countries (Appendix G).

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[14] For the United Arabic Emirates (UAE) neither an export nor an import value was recorded in the Trade Competitiveness Map in 2016. Even though the criterion relevant for the analysis was not matched, the UAE was due to its trading volume with Switzerland exceptionally included in the analysis. From 2012-2015, more than 50% of Swiss exports were destined for the UAE, while approximately 70% of Swiss imports originated from the UAE. Moreover, other sources (e.g. UN Comtrade) disclose exports/imports to/from the UAE in 2016, which indicates that an error may have occurred on the Trade Competitiveness Map.

5.3.3 Sub-Saharan Africa

The smallest recipient of Swiss exports is Sub-Saharan Africa, with only two countries (South Africa and Nigeria) from this region included in the analysis. From 2012 to 2016, Switzerland has reported a total export volume of $4.8bn to this region, while their trading partners reported a slightly higher number in their import statistics ($4.9bn). Therefore, the aggregated reporting discrepancy between Switzerland and its Sub-Saharan African partners only amounts to 2.10% ($0.10bn). However, the discrepancy at the individual level, especially for Nigeria (16.67%), is somewhat higher (Appendix H).

For Swiss merchandise imports the Sub-Saharan African region is substantially more important than for Swiss exports. Therefore, in terms of Swiss imports, eight Sub-Saharan African countries that met the criterion (minimum import value of $100m in 2016) were included in the analysis. Switzerland's reported import value amounts to $30.6bn, which is $6.4bn higher than the partner countries' mirror value ($24.2bn). This corresponds to an aggregated percentage difference of 21.06% by using Swiss imports as base. The largest discrepancies in this region result from Swiss imports from Nigeria (89.74%) and Ethiopia (46.72%) (Appendix I).

5.3.4 Asia Pacific

Besides Europe, Asia Pacific is the largest export market for Swiss goods, which is why 16 countries allocated to this region were included in the analysis. Over the five years' time period, Switzerland has reported exports in the amount of $506.6bn to Asia Pacific, whereas its 16 trading partners from this region have reported imports of $580.4bn from Switzerland. Therefore, the discrepancy at aggregated level amounts to $73.8bn, which equals 12.71%, using Asia Pacific's imports as base. Of the 16 trading partners allocated to the region Asia Pacific, exports to Singapore (-109.56%) and China (51.71%) resulted in the largest mirror statistics discrepancies (Appendix J).

For Swiss imports, also 16 countries in the region Asia Pacific did comply with the criterion relevant for the inclusion in the analysis. While Switzerland has reported a total import value from Asia Pacific of $166.9bn, their reporting partners only disclosed an export value to Switzerland of $127.2bn. Thus, the reporting discrepancy of Swiss imports from Asia Pacific equals $39.7bn (23.80%). Amongst all selected countries of the region, the largest mirror statistics discrepancies accrued at imports from Kazakhstan (-298.84%) and China (73.42%) (Appendix K).

5.3.5 Latin America

For the analysis of Swiss exports, nine Latin American countries were considered. Overall, Switzerland reported a total value of exports to Latin America of $29.1bn from 2012 to 2016. On the other hand, Latin America reported with $31.2bn imports from Switzerland a slightly higher mirror value. Therefore, the discrepancy between Switzerland's exports and Latin America's imports equals $2.1bn (6.63%). Even though the discrepancy at aggregated level seems to be rather small, at individual country level, some of the discrepancies are considerably larger. For instance, the discrepancy between Switzerland and Uruguay amounts to -34.87% or the one between Switzerland and Costa Rica equals 13.24% (Appendix L).

In terms of Swiss imports from Latin America, seven countries were included in the analysis. With $46.1bn Switzerland has reported a higher import value than the respective export value of its Latin American trading partners ($42.6bn). The discrepancy at aggregated level amounts to $3.5bn, which equals 7.65% on the basis of Swiss imports. Thereby, the largest discrepancies resulted from trade with Costa Rica (95.80%) and Mexico (27.62%) (Appendix M).

5.3.6 North America

For the analysis of Swiss exports, two countries, the United States and Canada, were allocated to the region North America. While Switzerland's reported export value amounts to $170.2bn, Canada's and the United States' accumulated import value equals $173.6bn. Hence, the aggregated discrepancy between Swiss exports and North American imports accounts for $3.4bn, which is, expressed as percentage of North American imports, 1.97%. Thereby, the discrepancy with the United States' reported value is 2.28%, whereas the one with Canada's value equals -0.67% (Appendix N).

In terms of Swiss exports, the same two countries were assigned to North America. Since the two North American partners have reported a total value of exported goods to Switzerland of $125.5bn and Switzerland has only reported an import value $123.2bn, a discrepancy of $-2.3bn occurred (-1.90%). While the discrepancy with the value reported by the United States only amounts to -3.69%, is the one with Canada's reported value 24.78% (Appendix O).

5.4 Conclusion of discrepancies per region

While the mirror statistics discrepancies among Switzerland's export and import data with the six different regions are relatively small at the aggregated level, there are

serious asymmetries at disaggregated level. Therefore, it should be noted that it is essential to look at mirror statistics discrepancies at bilateral level. Considering the case of Latin America, for example, the discrepancy of the Swiss export figure and the Latin American import figure amounts merely to 6.63%, whereas the largest discrepancies among this region originate from trade with Uruguay, -34.87%, and Costa Rica, 13.24%. Hence, it can be concluded that discrepancies at aggregated level is rather meaningless, since in many cases, such as in the one of Uruguay and Costa Rica, positive and negative discrepancies cancel each other out at aggregated level.

Therefore, the following part addresses both the largest Swiss export discrepancies (Part 5.5) as well as the largest Swiss import discrepancies (Part 5.6) at bilateral level from 2012 to 2016. Moreover, it attempts to explain the discrepancy causing factors for the five most outstanding export and the five most outstanding import discrepancies.

5.5 Largest export discrepancies

Table 1 displays the ten largest mirror statistics discrepancies from the perspective of Switzerland as exporting country. Thereby, $M^{Switzerland \text{ - } Leading \text{ } Partner}$ represents the reported import value of Switzerland's respective *Leading Partner*, whereas $E^{Switzerland \text{ – } Leading \text{ } Partner}$ outlines Switzerland's reported value of exported goods to the respective *Leading Partner*. The *Percentage Difference*, or $DIF(E)^{Switzerland}$, is the determining factor for the table's ranking; it shows the deviation between the leading partner's reported import value and Switzerland's reported export value as percentage of the leading partner's reported import value.

A positive $DIF(E)^{Switzerland}$ indicates that the leading partner's reported import value is larger than Switzerland's reported exported value. Therefore, either the leading partner over-reports its imports or Switzerland under-reports its exports. A negative $DIF(E)^{Switzerland}$ suggests the opposite.

Leading Partners Exports Switzerland	Region	Imports from Switzerland $M^{Switzerland\,-\,Leading\ Partner}$ USD ('000)	Exports to Partner $E^{Switzerland\,-\,Leading\ Partner}$ USD ('000)	Percentage Difference $DIF(E)^{Switzerland}$
Singapore	Asia Pacific	20,491,334	42,941,589	-109.56%
Israel	MENA	22,355,902	5,777,975	74.15%
Netherlands	Europe	15,710,023	27,193,666	-73.10%
Spain	Europe	17,948,447	29,386,475	-63.73%
China	Asia Pacific	200,762,350	96,945,917	51.71%
Uruguay	Latin America	648,502	874,657	-34.87%
Italy	Europe	65,633,100	84,276,680	-28.41%
Lebanon	MENA	2,825,445	3,540,149	-25.30%
Oman	MENA	937,706	1,151,713	-22.82%
Algeria	MENA	2,903,748	2,261,729	22.11%

Table 1: Switzerland's 10 Largest Export Discrepancies (International Trade Center, 2018)

As shown in Table 1, the largest percentage reporting discrepancy accrued on Swiss exports to Singapore. However, this does not necessarily indicate, that this also represents the largest discrepancy in absolute terms. The absolute reporting discrepancy to China, for instance, equals $103.8bn, whereas the one to Singapore amounts only to $-22.5bn, even though the percentage difference of exports to China is lower.

In the following section, the paper shows the five largest percentage discrepancies[15] (darkened in Table 1) at a detailed level. It breaks the discrepancies down to the product groups, from which the asymmetries mainly accrued[16]. Subsequently, it attempts to explain the causes of the mirror statistics asymmetries.

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[15] Singapore (-109.56%), Israel (74.15%), the Netherlands (-73.10%), Spain (-63.73%), China (51.71%)

[16] The data required for the breakdown was taken from the UN Comtrade database directly, rather than from the ITC's Trade Competitiveness Map. Therefore, trade figures can slightly differ, which nevertheless does not significantly distort the results. Any deviations are indicated directly in the tables attached to Appendices P to T.

5.5.1 Singapore

From Switzerland's perspective as exporter, the largest percentage discrepancy that occurred was the one between Singapore's declared imports and Switzerland's reported exports. The following Figures 1 and 2 depict the development of the discrepancy from 2012 to 2016.

Figure 1: Discrepancy between Singapore's reported Imports and Switzerland's reported Exports (International Trade Center, 2018)

Figure 2: Percentage Difference (Singapore - Switzerland with Singapore as base) (International Trade Center, 2018)

As shown in Figure 2, the *Percentage Difference*, or the $DIF(E)^{Switzerland}$, remained during the entire period negative. Thus, exports declared by Switzerland were over the whole 5 years larger than Singapore's reported imports (Figure 1). This indicates that either Switzerland was over-reporting its exports to Singapore, or Singapore was under-reporting its imports from Switzerland.

The tables in Appendix P break the total value of trade down to the largest product groups, in order to determine which products are causing the discrepancy. It was found that Switzerland's export of non-monetary gold[17] (SITC Code 97) causes the entire discrepancy. While Switzerland reported gold exports to Singapore amounting to

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[17] Covers all gold other than monetary gold; monetary gold is the gold which is held as reserve assets by monetary authorities (e.g. central banks) (United Nations, 2016c)

$24.265bn, Singapore has only declared gold imports from Switzerland worth the amount of $1.747bn. Thus, the entire mirror statistics discrepancy of $-22.5bn can be explained by the trade of non-monetary gold.

Main Discrepancy: Transshipments

In the case of Singapore, it is very likely that the main causes of the discrepancy are transshipments. As explained in Part 4.2.3, Singapore is due to its favorable location a typical trade hub of the Asian market. Merchandise is mostly shipped via the port of Singapore (or Hong Kong) before it is re-exported to the final destination. As indicated above, the entire discrepancy (-$22.5bn) can be traced back to Switzerland's exports of non-monetary gold products. Thereby, the reported imports of Singapore were smaller than Switzerland's reported exports. The analysis of Swiss exports to China (Part 5.5.5) shows that also the non-monetary gold exports are responsible for the entire discrepancy ($102.64bn). In the case of exports to China, however, China's reported imports are larger than Switzerland's respective exports. Hence, it can be assumed that many Swiss exporters of non-monetary gold products indicate Singapore as *last known destination*, even though these products are re-exported to various countries such as China (Appendix Z, Q13).

Open Customs Warehouses

Part 4.1.2 showed how time lags due to interim storage in OCWs can cause bilateral trade discrepancies. Since the main discrepancy with Singapore can be traced back to non-monetary gold products, which are often stored in such OCWs, it might be another reason for the asymmetry (Appendix Z, Q14).

Different Trade Systems

As described in Part 4.2.1, the application of different trade systems may also cause bilateral trade asymmetries. While Switzerland applies the special trade system (Part 5.1.3), Singapore makes use of the general one, which may be another factor of the existing mirror statistics discrepancy (United Nations, 2016d).

Currency Conversion

Finally, the usage of different exchange rates, as described in Part 4.1.3, might be another cause of the discrepancy between Switzerland and Singapore. Switzerland reports its exports in Swiss francs (Part 5.1.1), whereas Singapore its imports in US

dollars. Therefore, the Swiss export value needs to be converted and could, by applying an inaccurate exchange rate, cause a discrepancy (United Nations, 2016d).

5.5.2 Israel

Also the discrepancy between Switzerland's reported exports and the respective mirror value of Israel's imports was in terms of percentage difference one of the biggest. The following graph shows Israel's import and Switzerland's export values for each year.
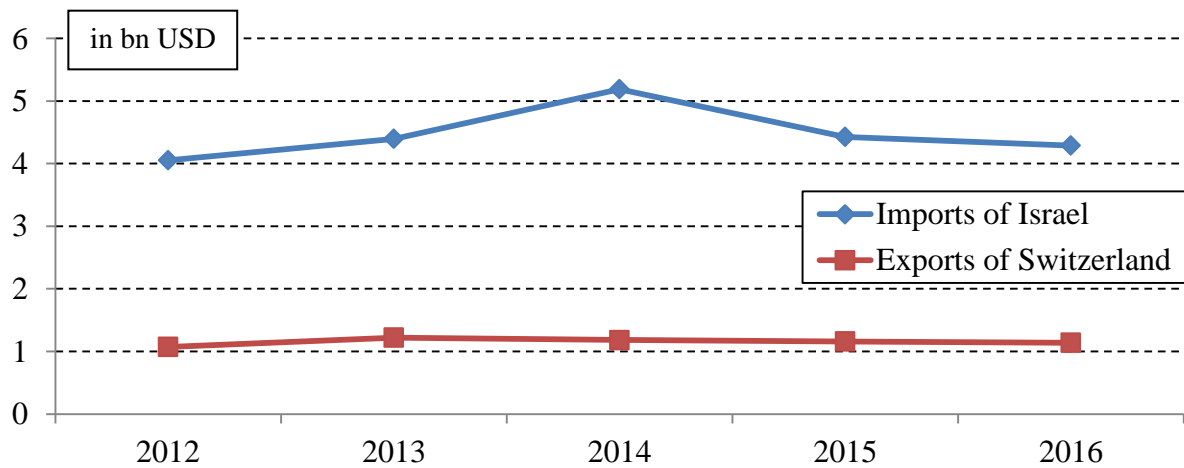
Figure 3: Discrepancy between Israel's reported Imports and Switzerland's reported Exports (International Trade Center, 2018)
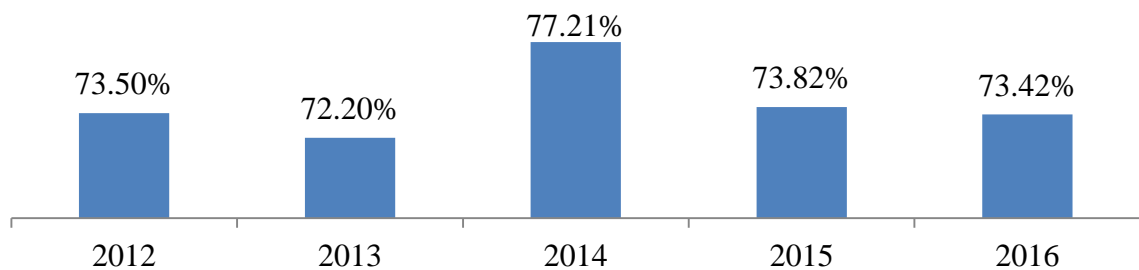
Figure 4: Percentage Difference (Israel - Switzerland with Israel as base) (International Trade Center, 2018)

As shown in Figure 4, the $DIF(E)^{Switzerland}$ was for each year from 2012 to 2016 positive, which indicates that Switzerland's declared export values were smaller than Israel's reported import values. Hence, either Switzerland was under-reporting its exports to Israel or Israel was over-reporting its imports from Switzerland.

According to Appendix Q, the discrepancy can be traced back to several product groups. It was found that Israel reports for almost every product group a higher import value than Switzerland's respective export value. Thereby, over 50% of the total discrepancy of $16.5bn was caused by non-metallic mineral manufactures (25.82%;

SITC Code 66), Petroleum products (14.97%; SITC Code 33) as well as cereals (12.52%; SITC Code 04). Numerous other product groups with relatively small trade volumes, titled as "Residual" in Appendix Q, accounted for 27.09% of the total mirror statistics discrepancy.

Main Discrepancy: Swiss Commodity Traders / Error in Collection Process

As indicated above, the main discrepancy with Israel accrued due to exports of commodities such as petroleum products. It can therefore be assumed that a considerable part of this bilateral trade asymmetry could be related to the involvement of Switzerland's international commodity traders and Israel's trade partner attribution (Appendix Z, Q15). For example, a Swiss commodity trader such as Glencore purchase petroleum from a third country and then resells it to Israel at a premium. Thereby, the petroleum never enters the statistical territory of Switzerland, which is why Switzerland neither reports it as import nor export. Since Israel does not know the actual *country of origin*, it would take the address of the seller, hence Glencore in Switzerland. Even though Israel attributes its imports according to the recommended *country of origin* method, this transaction leads to a discrepancy, as an error was made in the data collection process (Part 4.3.3) (United Nations, 2016e).

Imports and Exports Valuation

Another cause of the positive $DIF(E)^{Switzerland}$ might be Switzerland's valuation of exports on FOB basis (Part 5.1.2) and Israel's valuation of imports on CIF basis (United Nations, 2016e). As explained in Part 4.1.1, imports include, in addition to the transaction price of the product, shipping and insurance costs. Therefore, the reported imports are larger than the reported exports. However, in general, such differences should be modest.

Currency Conversion

The exchange rate used could also have played a role in the discrepancy between Switzerland and Israel. Since Israel reports its imports in US dollars, their value does not have to be converted (United Nations, 2016e). However, depending on the exchange rate used, a discrepancy could emerge from the conversion of Switzerland's reported export value.

5.5.3 The Netherlands

The largest percentage discrepancy within the European area from Switzerland's perspective as an exporter accrued due to shipments to the Netherlands. The reported values of both countries are depicted by Figure 5, whereas Figure 6 presents the respective percentage discrepancy.

Figure 5: Discrepancy between the Netherland's reported Imports and Switzerland's reported Exports (International Trade Center, 2018)
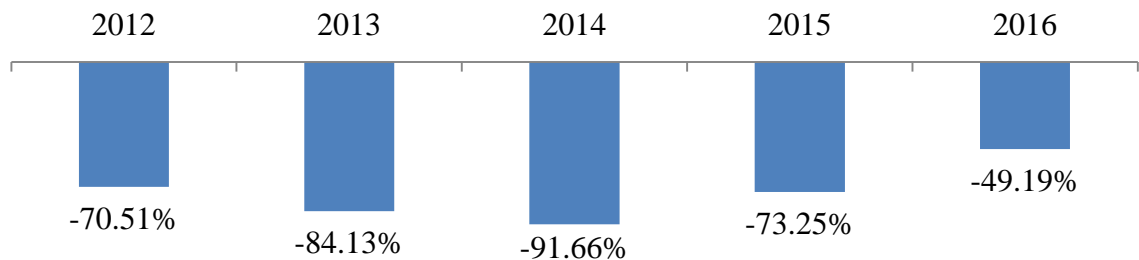
Figure 6: Percentage Difference (the Netherlands – Switzerland with the Netherlands as base) (International Trade Center, 2018)

The reported export value of Switzerland to the Netherlands was on average each year about $2.2bn higher than the Netherlands' reported value of imported goods from Switzerland. The $DIF(E)^{Switzerland}$, shown by Figure 6, decreased from -91.66% in 2014 to -49.19% in 2016, indicating that the discrepancy between reported import and export values is on a downward trend.

With help of the tables in Appendix R, which disclose Swiss exports to the Netherlands divided into product groups, it was attempted to trace back the discrepancy to specific products. It was found that Switzerland reports for each product group a higher export value than the Netherlands' respective import value. The largest part of the total discrepancy, namely 35.51%, can be explained through exports of

miscellaneous manufactured articles[18] (SITC Code 89). However, over the 5 year period also the trade of medicinal and pharma products (SITC Code 54) has caused a discrepancy of $-1.57bn (12.01%), and thus significantly contributed to the total discrepancy. Almost one third of the total discrepancy (29.57%) occurred due to numerous product groups with small trade volumes, referred to as "Residual" in Appendix R.

Main Discrepancy: Transshipments

The discrepancy with the Netherlands is comparable to the discrepancy with Singapore described above (part 5.5.1). Just as Singapore is known as a trading hub in Asia, the Netherlands is known for it in Europe. Therefore, it can be assumed that the main cause of the existing discrepancy can be explained through transshipments. As explained in Part 4.2.3, all kinds of merchandise are often shipped to the Netherlands before they are re-exported intercontinentally from the port of Rotterdam, for example. Since these products are neither transformed in the Netherlands nor remain there, the Netherlands does not notify them as imports from Switzerland. The Swiss exporter does often not know that transshipment is happening and therefore attributes the Netherlands as *country of last known destination*, where the goods are, however, only in transit (Appendix Z, Q12).

Currency Conversion

Another discrepancy causing factor might be different exchange rates used to convert the Netherland's reported import values and Switzerland's reported export values to US dollars. Since Switzerland reports export values in Swiss francs, as explained in Part 5.1.1, and the Netherlands report import values in euros, bilateral trade asymmetries may occur if inaccurate exchange rates are used (United Nations, 2016f).

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[18] Miscellaneous manufactured articles contain: Arms ammunition; Printed matter; Articles of plastic; Baby carriages, toys, games, and sporting goods; Office and stationery supplies; Works of art, collectors' pieces; Jewellery; Musical instruments, records, tapes, other sound recordings (United Nations, 2018b)

5.5.4 Spain

Figures 7 and 8 depict that large mirror statistics discrepancies also resulted from Swiss exports to Spain. As for exports to the Netherlands, also for exports to Spain, Switzerland reported higher export values than the corresponding import values reported by its partner countries.
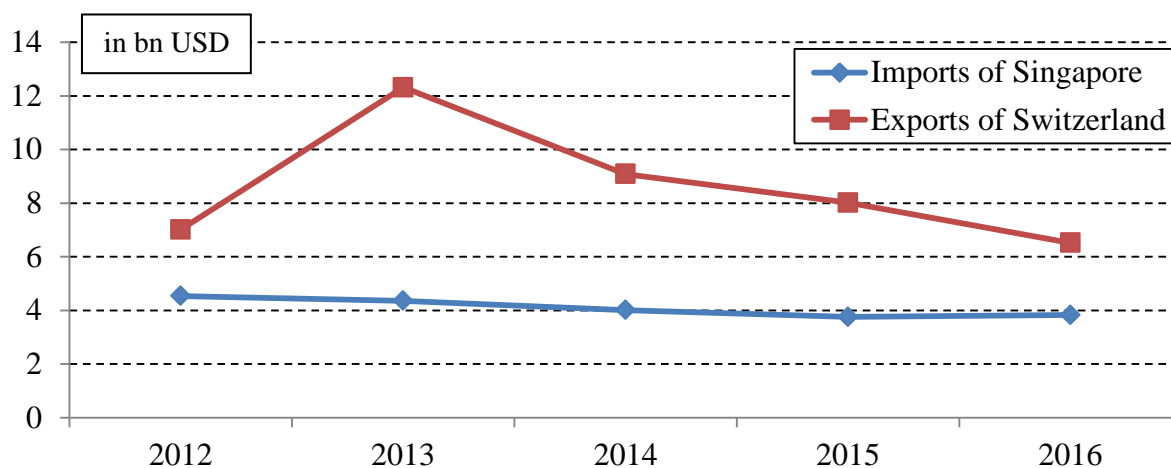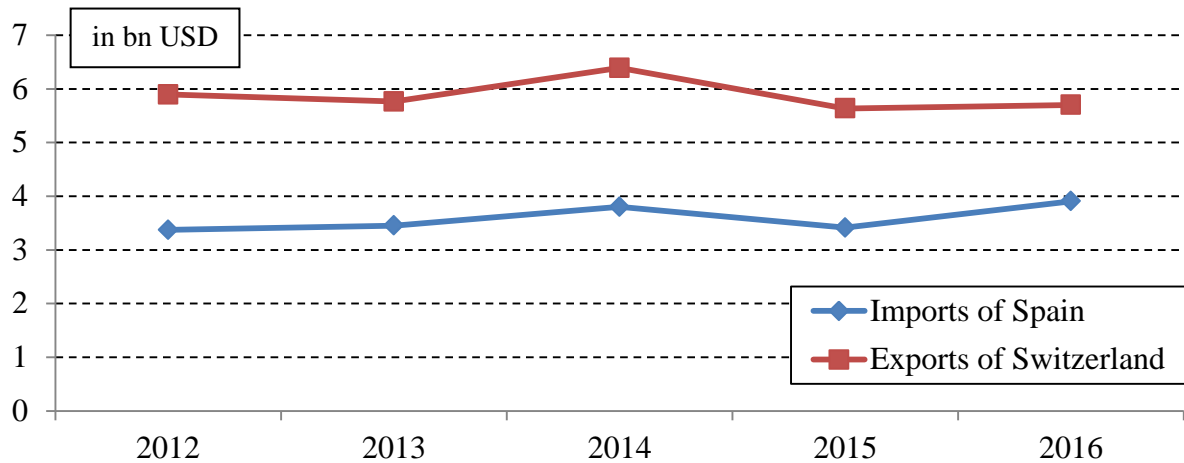

Figure 7: Discrepancy between Spain's reported Imports and Switzerland's reported Exports (International Trade Center, 2018)
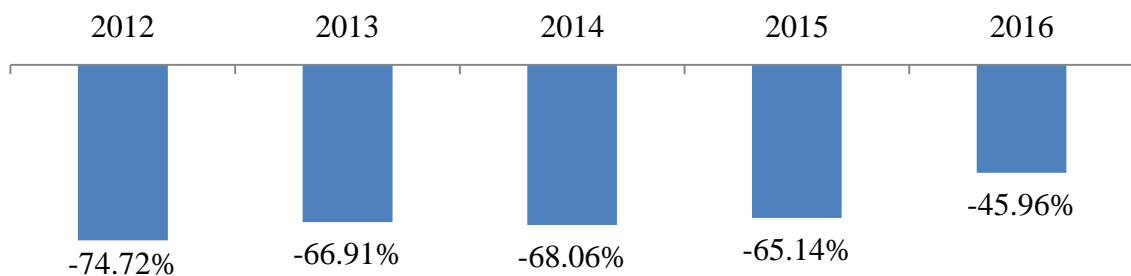
Figure 8: Percentage Difference (Spain - Switzerland with Spain as base) (International Trade Center, 2018)

The discrepancies remained quite stable from 2012 to 2014 at around $-2.2bn to $-2.6bn, whereas in the last year of the investigation period it decreased to approximately $-1.8bn.

According to Appendix S, most of the total mirror statistics discrepancy of $-11.4bn occurs from trade with medicinal and pharma products (37.12%; SITC Code 54), organic chemicals (34.12%; SITC Code 51) and various product categories with smaller trade volumes (18.56%; referred to as "Residual").

Main Discrepancy: Transshipments

Just as the Netherlands (Part 5.5.3) and Singapore (Part 5.5.1), also Spain is known for its position as a trading hub. Therefore, various products are shipped to Spain

before they are re-exported to South America for example. Since Spain does not report Swiss goods which are in transit only as imports and Swiss exporters do often not know that transshipment is happening and therefore attribute Spain as *country of last known destination*, these discrepancies occur. It can therefore be assumed that most of the discrepancy with Spain is due to re-exports (Appendix Z, Q11).

Currency Conversion

Just as for the Netherlands, a different exchange rate used might have also contributed to the existing discrepancy with Spain. As mentioned in Part 5.1.1, Switzerland reports its exports in Swiss francs, whereas the import values of Spain are reported in euros (United Nations, 2016g). Depending on the accuracy of the exchange rate used by the UNSD to convert the reported values into US dollars (for the UN Comtrade database), discrepancies may occur (Part 4.1.3).

5.5.5 China

The largest mirror discrepancy in absolute terms occurred from Swiss exports to China. From 2012 to 2016, China has reported $200.8bn imports from Switzerland, whereas Switzerland has only declared $96.9bn exports to China, which equals to a total mirror discrepancy of $103.8bn. The following figures compare the reported values of both countries for each year.
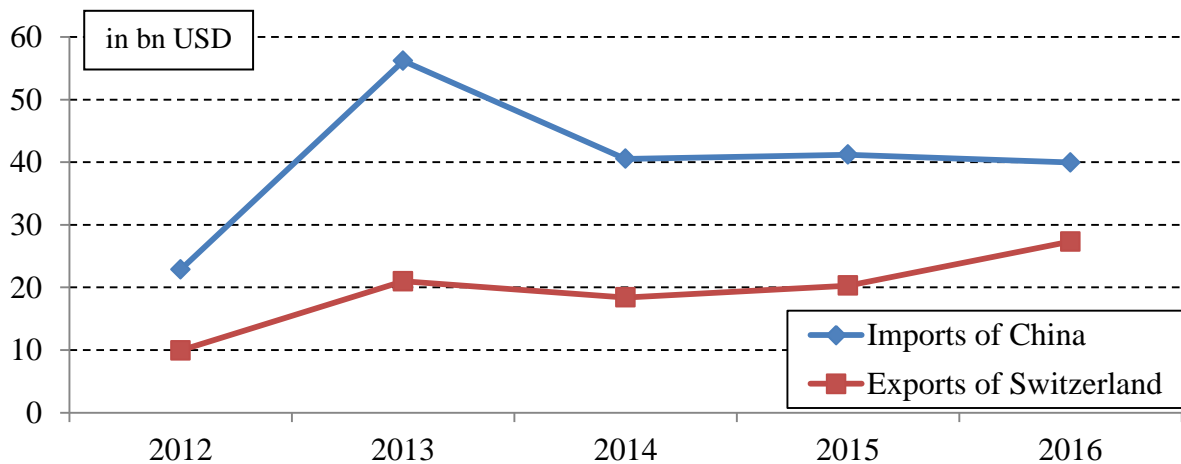
Figure 9: Discrepancy between China's reported Imports and Switzerland's reported Exports (International Trade Center, 2018)
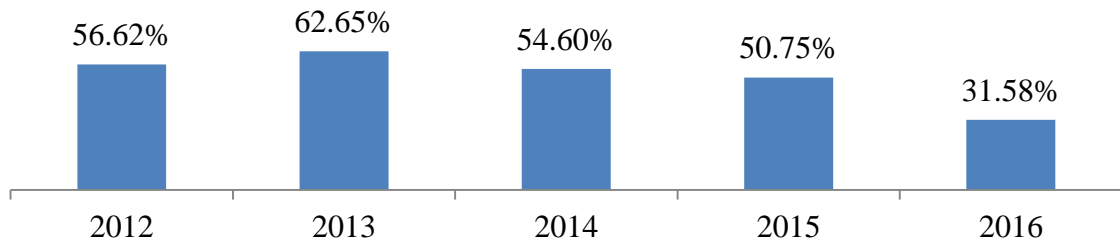
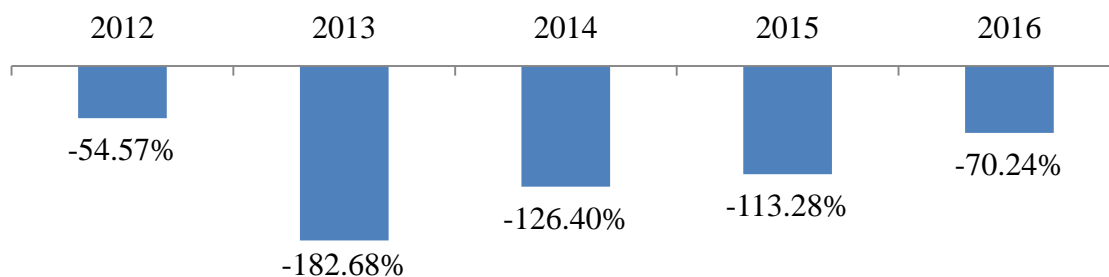*Figure 10: Percentage Difference (China – Switzerland with China as base) (International Trade Center, 2018)*

As shown in the diagrams, the largest difference between Switzerland's reported exports and China's reported imports resulted from trade in 2013. While China has reported a total value of $56.2bn, Switzerland only declared $21.0bn, which amounts to a discrepancy of $35.2bn. In the following years, however, the mirror statistics discrepancy decreased significantly and amounted in 2016 to $12.6bn.

According to Appendix T, the entire mirror discrepancy of $103.8bn is caused by trade of non-monetary gold (SITC Code 97). From 2012 to 2014, China has classified the largest part of Swiss imports as "special transactions and commodities not classified according to kind" (SITC Code 93), whereby Switzerland has already declared the largest part of exports as non-monetary gold (SITC Code 97), rather than as "special transactions". However, from 2015 onwards, China has not recorded any goods as "special transaction" anymore, but it classified the largest parts of imports from Switzerland as non-monetary gold. Therefore, it can be assumed that the products imported by China between 2012 and 2014, which were classified as "special transactions", were in fact non-monetary gold products.

Main Discrepancy: Transshipments

To explain the discrepancy between Switzerland's declared exports and China's declared imports, it is important to take into account the bilateral trade asymmetry with Singapore (Part 5.5.1). As mentioned in Part 4.2.3, there are two main trade hubs in the Asian market, namely Hong Kong as well as Singapore. Most of Swiss exports to the Asian market are shipped via these trade hubs, which might also be the main cause of the discrepancy with China. As mentioned above, the discrepancy of exports to both China and Singapore can be traced back to the trade of non-monetary gold. While Switzerland has fewer non-monetary gold exports than China's reported imports, Switzerland's declared exports are higher than Singapore's mirror value. It can therefore be assumed that Swiss exporters may not be aware of transshipments over Singapore

taking place, which is why they report Singapore as *country of last known destination*. Since China correctly states Switzerland as *country of origin*, the discrepancy emerges (Appendix Z, Q14).

Open Customs Warehouses

Just as for exports to Singapore (Part 5.5.1) also non-monetary gold exports to China which are put into interim storage in OCWs might have led to time lags and hence discrepancies (Part 4.1.2).

Different Trade Systems

Like Singapore, also China applies the general trade system (United Nations, 2016h). Switzerland, however, uses the special one (Part 5.1.3). As described in Part 4.2.1, the application of different trade systems can be another cause of mirror statistics discrepancies.

Imports and Exports Valuation

The positive $DIF(E)^{Switzerland}$ indicates that imports are valued higher than exports. This discrepancy might be partly explained by the different valuation of exports and imports. While Switzerland values exports based on a FOB basis (Part 5.1.2), China values imports on a CIF basis (United Nations, 2016h). Therefore, China's imports are larger than the respective mirror value reported by Switzerland, since they additionally include insurance and transport costs.

Currency Conversion

While Swiss trade statistics are collected in Swiss francs (Part 5.1.1), the one of China is compiled in US dollars (United Nations, 2016h). Thus, depending on the exchange rate used by the international organization, bilateral trade asymmetries may arise between the partners (Part 4.1.3).

5.6 Largest import discrepancies

The ten largest mirror statistics discrepancies from the perspective of Switzerland as an importer are shown in Table 2. While $M^{Leading\ Partner\ -\ Switzerland}$ represents Switzerland's reported value of imported goods from their respective *Leading partner*, $E^{Leading\ Partner\ -\ Switzerland}$ accounts for the respective *Leading Partner's* reported value of exported merchandise to Switzerland. The *Percentage Difference*, or $DIF(I)^{Switzerland}$, shows the mirror statistics discrepancy calculated as percentage of Switzerland's reported import value.

A positive $DIF(I)^{Switzerland}$ indicates that Switzerland's reported import value is larger than the exporting value reported by its leading partner. In the case of a positive *Percentage Difference*, Switzerland either over-reports its imports, or the leading partner under-reports its value of exported goods to Switzerland. A negative $DIF(I)^{Switzerland}$ suggests the opposite.

Leading partners Imports Switzerland	Region	Imports from Partner $M^{Leading\ Partner\ -\ Switzerland}$ USD ('000)	Exports to Switzerland $E^{Leading\ Partner\ -\ Switzerland}$ USD ('000)	Percentage Difference $DIF(I)^{Switzerland}$
Kazakhstan	Asia Pacific	4,805,251	19,165,051	-298.84%
Israel	MENA	3,296,151	6,892,811	-109.12%
Russia	Europe	14,458,075	28,339,858	-96.01%
Costa Rica	Latin America	545,565	22,925	95.80%
Nigeria	SS Africa	3,082,045	316,173	89.74%
Pakistan	Asia Pacific	573,957	76,769	86.62%
Cambodia	Asia Pacific	741,828	113,840	84.65%
China	Asia Pacific	62,226,235	16,539,988	73.42%
Taipei, CHN	Asia Pacific	5,163,837	2,295,397	55.55%
Lebanon	MENA	2,060,118	967,154	53.05%

Table 2: Switzerland's 10 Largest Import Discrepancies (International Trade Center, 2018)

Table 2 indicates, that the largest percentage discrepancy between Switzerland's reported import value and its leading partner's reported export value accrued from trade with Kazakhstan (-298.84%). The largest absolute discrepancy, however, results from imports from China ($45.7bn).

In the following section of this paper, five mirror statistics discrepancies[19] (darkened in Table 2) are analyzed in more detail. For the selection of the countries to

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[19] Kazakhstan (-298.84%), Israel (-109.12%), Russia (-96.01%), Nigeria (89.74%), China (73.42%)

be analyzed, not only the $DIF(I)^{Switzerland}$ was taken into consideration, but also the size of the absolute discrepancy. Instead of choosing Costa Rica for the detailed analysis, China has been selected in spite of the lower percentage difference. While the absolute discrepancy with Costa Rica only amounts to \$522m, the discrepancy with China equals to \$45.7bn, which is around 88 times higher. Thus, it is likely that analyzing China in place of Costa Rica, Pakistan or Cambodia, leads to more meaningful results.

In the following analysis of the five selected countries, the paper shows the incurred discrepancies at annual level. Subsequently, it breaks the discrepancies down to industry level[20], before it attempts to explain factors causing the discrepancies.

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[20] The data required for the breakdown was taken from the UN Comtrade database directly, rather than from the ITC's Trade Competitiveness Map. Therefore, trade figures can slightly differ, which nevertheless does not significantly distort the results. Any deviations are indicated directly in the tables attached to Appendices U to Y.

5.6.1 Kazakhstan

From Switzerland's perspective as importer, the largest percentage discrepancy that occurred was the one between Switzerland's declared imports and Kazakhstan's reported exports. The following Figures 11 and 12 depict the development of the discrepancy from 2012 to 2016.
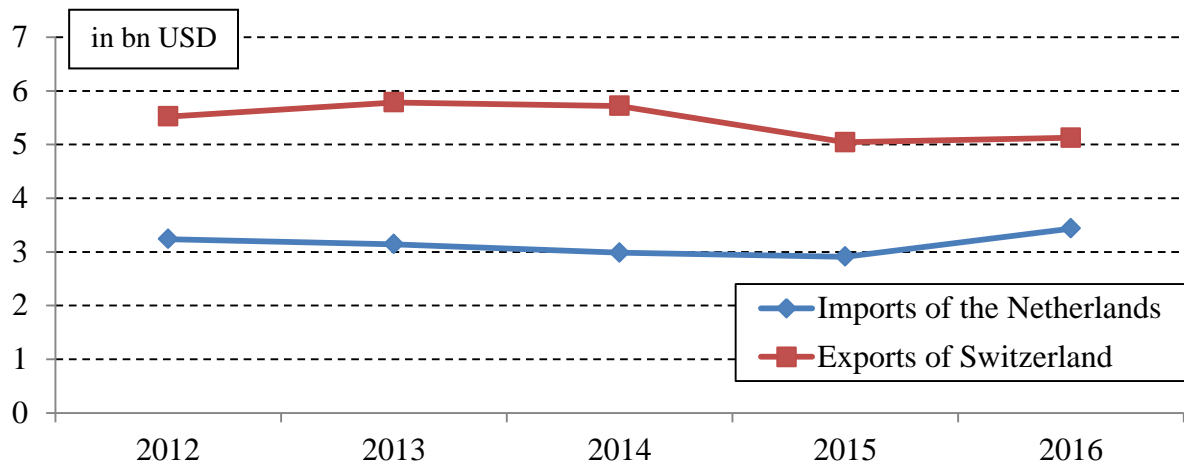

Figure 11: Discrepancy between Switzerland's reported Imports and Kazakhstan's reported Exports (International Trade Center, 2018)
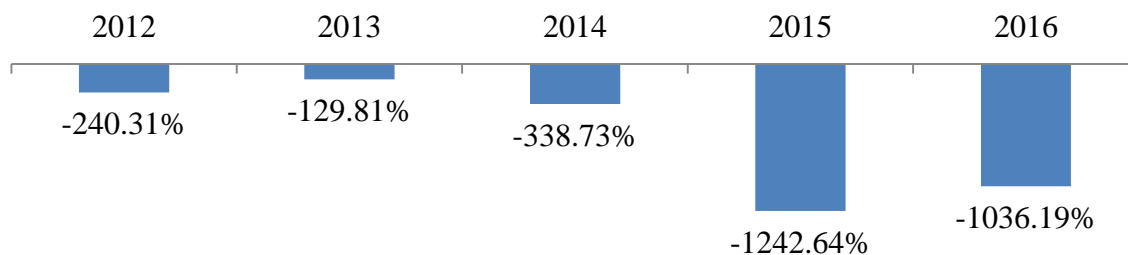
Figure 12: Percentage Difference (Switzerland – Kazakhstan with Switzerland as base) (International Trade Center, 2018)

The absolute mirror discrepancy amounted on average to \$-2.9bn per year and was in 2012 and 2014, in absolute terms, the largest (\$-3.5bn). Due to small import values reported by Switzerland, which were used as base to calculate the percentage difference ($DIF(I)^{Switzerland}$), the percentage discrepancy reached its peak in 2015, even though it was not the largest in absolute terms. The negative $DIF(I)^{Switzerland}$ indicates that either Switzerland's partner country, in this case Kazakhstan, has over-reported its exports to Switzerland, or Switzerland has under-reported its imports from the partner country.

The table in Appendix U breaks the total trade volume down to product categories in order to determine from which products the discrepancy mainly occurs. It was found that almost the entire discrepancy can be traced back to petroleum products.

While Kazakhstan has reported $15.3bn petroleum exports to Switzerland, Switzerland has only disclosed an import value for the same products of $2.8bn. Hence, the discrepancy caused by petroleum products amounts to $-12.5bn which is almost 87% of the total discrepancy of $-14.4bn.

Main Discrepancy: Swiss Commodity Traders / Error in Collection Process

Since almost the entire discrepancy with Kazakhstan is due to imports of petroleum products, it can be assumed that Swiss commodity traders are involved in these discrepancy causing transactions. The problem could be similar to that of Swiss exports to Israel, which is explained in Section 5.5.2. Many commodity traders which acquire petroleum from various countries are located in Geneva, Switzerland. At the time the petroleum is released for export, the Kazakh supplier may not know the final destination of these products, which is why he records the buyer's address in Switzerland and thus Switzerland as *country of last known destination*. However, since Swiss commodity traders generally resell the goods directly to a third country at a premium, the products never enter the statistical territory of Switzerland, which is why they are not included in the import statistics, thus creating bilateral trade asymmetry (Appendix Z, Q6&17).

Different Trade Systems

While Kazakhstan applies the general trade system, Switzerland uses the special one (Part 5.1.3). As explained in Section 4.2.1, the application of different trade systems can be another factor for bilateral trade asymmetries (United Nations, 2016i).

Currency Conversion

As explained in Part 4.1.3, differences may occur depending on the exchange rate used when trading data is denominated in a currency other than the US dollar. Since Switzerland reports its statistics in Swiss francs (Part 5.1.1) the data needs to be converted to US dollars which could be a further cause of the bilateral trade asymmetry. According to the UN (2016i), however, trade data of Kazakhstan's does not have to be converted since it is already reported in US dollars.

5.6.2 Israel

Israel ranks second in the list of the largest percentage discrepancies, not only from the perspective of Switzerland as exporter (Table 1, p. 31), but also from the perspective of Switzerland as importer (Table 2, p. 42). As the following two figures depict, Switzerland's reported import value was each year significantly smaller than the respective mirror value reported by Israel.
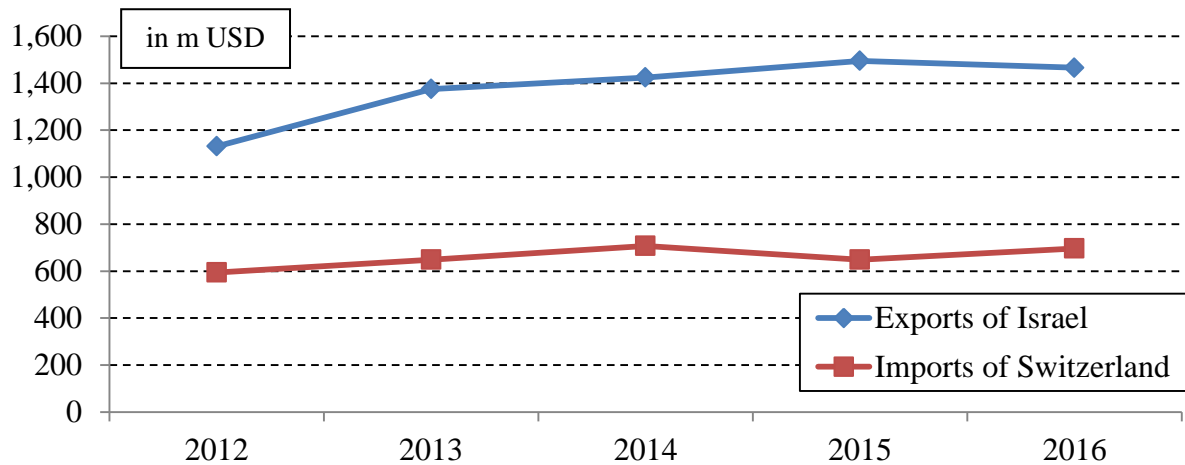
Figure 13: Discrepancy between Switzerland's reported Imports and Israel's reported Exports (International Trade Center, 2018)
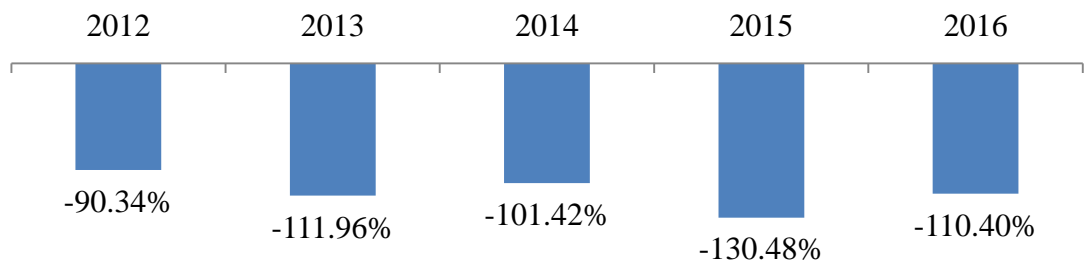
Figure 14: Percentage Difference (Switzerland – Israel with Switzerland as base) (International Trade Center, 2018)

Except in 2012, the $DIF(I)^{Switzerland}$ was lower than -100%, indicating that Israel has reported more than twice as much exports than the respective mirror value reported by Switzerland. It stands out that Israel not only reported a considerably larger value than Switzerland in terms of its imports (Part 5.3.2) but also in terms of its exports.

According to Appendix V, the total discrepancy of $-3.6bn over the five year period can entirely be explained by large differences between the countries when reporting non-metallic mineral manufactures (SITC Code 66). While Switzerland has reported a total value of imports from Israel of this product category amounting to $1.9bn, Israel has declared exports of the same products of $5.7bn. Hence, the

discrepancy resulting from non-metallic mineral manufactures equals $-3.8bn, and thus accounts for the entire mirror statistics asymmetry.

Main Discrepancy: Swiss Traders / Different Partner Country Attribution

As explained above, in the case of Israel, the entire discrepancy can be traced back to imports of non-metallic mineral manufactures. It can be assumed that there are Swiss companies that purchase such goods from Israel and subsequently resell them internationally. Similar like for petroleum imports from Kazakhstan, these goods never enter Switzerland's statistical territory, which is why they are not included in the import statistics. Since Israel attributes their exports according to the *country of sale*, these discrepancies may occur (United Nations, 2016e). As described in Section 4.2.2, a different attribution of trade partners can lead to mirror statistics discrepancies.

Currency Conversion

The exchange rate used by the UNSD to convert Swiss imports from Swiss francs into US dollars could also have played a role in the bilateral trade asymmetry. While Switzerland reports its imports in Swiss francs (Part 5.1.1), Israel reports its exports in US dollars (United Nations, 2016e).

5.6.3 Russia

The total deviation of -96% between Switzerland's reported imports from Russia and Russia's reported exports to Switzerland represents the third biggest percentage discrepancy from Switzerland's perspective as importer. The following line chart depicts the development of Switzerland's reported imports and Russia's reported exports.
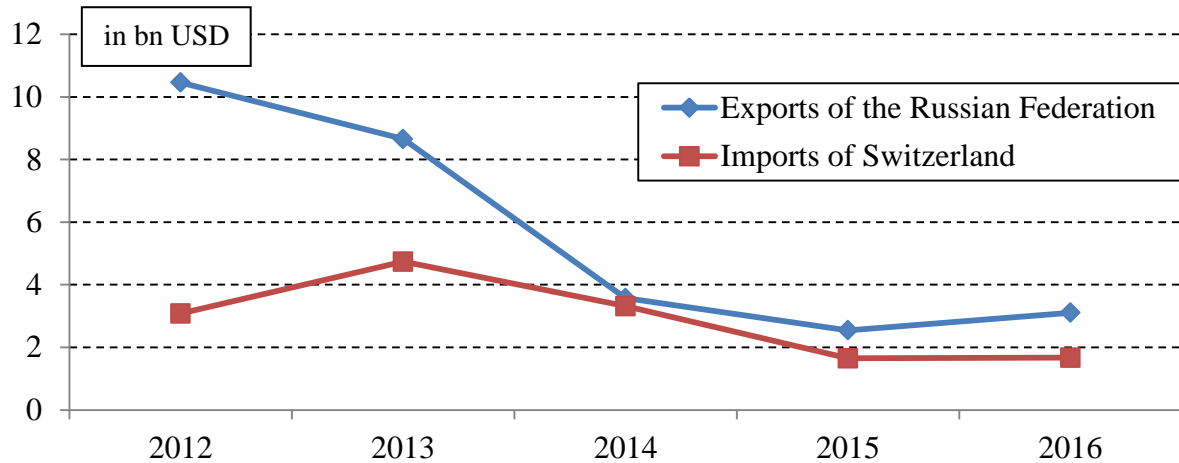
Figure 15: Discrepancy between Switzerland's reported Imports and Russia's reported Exports (International Trade Center, 2018)
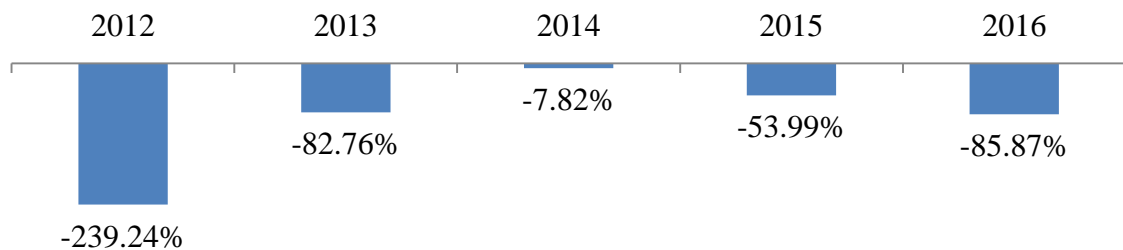
Figure 16: Percentage Difference (Switzerland – Russia with Switzerland as base) (International Trade Center, 2018)

As shown in Figures 15 and 16, the largest discrepancy between Switzerland's reported imports and Russia's reported exports in both absolute as well as percentage terms occurred in the year 2012. Compared to Russia's mirror value, Switzerland has reported lower imports of goods for each of the five years considered. In 2014, the discrepancy solely amounted to $-0.26bn and was thus the lowest of the whole period.

According to Appendix W, the discrepancy mainly occurred since Russia declared distinctively larger values than Switzerland for both petroleum products (83.3%; SITC Code 33) as well as non-ferrous metals[21] (13.25%; SITC Code 68). On

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[21] Non-ferrous metals contain: Silver, platinum; Copper; Nickel; Aluminum; Lead; Zinc; Tin; Other non-ferrous base metals (United Nations, 2018c)

the other hand, Switzerland has reported \$10.6bn imports of non-monetary gold products (SITC Code 97), whereas Russia only reported exports amounting to \$8.8bn. Unlike other product categories, Switzerland has therefore reported significantly higher values for non-monetary gold products than Russia, resulting in a positive discrepancy of \$1.8bn and thus reducing the overall discrepancy.

Main Discrepancy: Swiss Commodity Traders / Error in Collection Process

As mentioned above, the main discrepancy with Russia accrued mainly due to imports of petroleum. According to the Swiss Federal Customs Administration (Appendix Z, Q16), it is also assumed in this case that the discrepancy is related to transactions of Swiss commodity traders. As in the case of Kazakhstan (Part 5.6.1), Russian commodity suppliers may not be aware of the final destination of their products, which is why they indicate the address of the buyer and thus the Swiss commodity trader in the customs declaration. International commodity traders based in Switzerland generally resell the goods directly, which is why they are not included in import statistics, as they never enter the statistical territory of Switzerland. Nevertheless, since Russia probably states Switzerland as *country of last known destination*, such discrepancies occur.

Open Customs Warehouses

As mentioned in Part 4.1.2, precious metals such as gold are often stored in OCWs, which can lead to statistical delays. As a large part of the discrepancy with Russia can be explained by imports of non-monetary gold, it can be assumed that OWCs could also have played a role in the mirror discrepancy in the case of Russia.

Different Trade Systems

Just as Kazakhstan also Russia applies the general trade system, whereas Switzerland applies the special on (Part 5.1.3). As explained in Section 4.2.1, the application of different trade systems can lead to bilateral trade asymmetries (United Nations, 2016j).

Currency Conversion

According to the UN (2016j), Russia reports its exports in US dollars. However, since Switzerland reports its imports in Swiss francs (Part 5.1.1), mirror statistics discrepancies may occur depending on the exchange rate used by the UNSD (Part 4.1.3).

5.6.4 Nigeria

The only African country that was analyzed in detail was Nigeria with a total mirror statistics discrepancy of 89.74%. Figures 17 and 18 depict how Switzerland reported significantly larger imports from Nigeria compared to the respective export value reported by Nigeria.
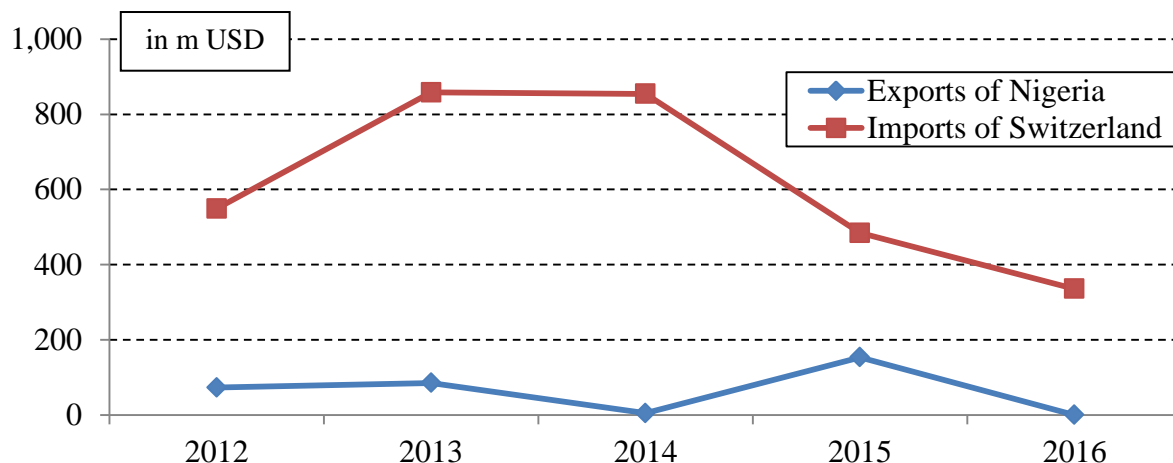
Figure 17: Discrepancy between Switzerland's reported Imports and Nigeria's reported Exports (International Trade Center, 2018)
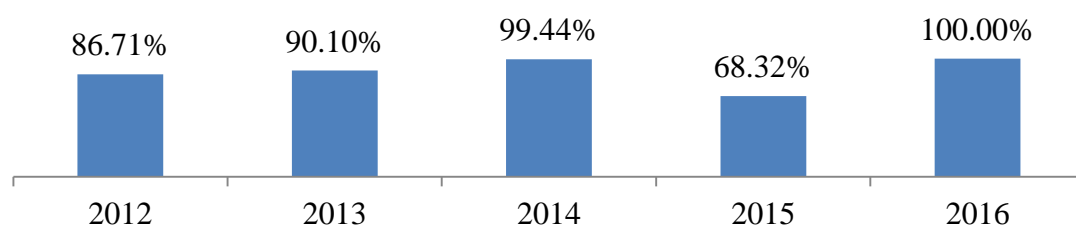
Figure 18: Percentage Difference (Switzerland – Nigeria with Switzerland as base) (International Trade Center, 2018)

According to the Competitiveness Map on which Figures 17 and 18 are based, Nigeria has not reported any exports to Switzerland in 2016. Therefore, the respective $DIF(I)^{Switzerland}$ of this year was with 100% the largest, despite being the second smallest discrepancy in absolute terms. Overall, it was found, that Nigeria has reported remarkably low export values to Switzerland over the whole time considered.

Unlike Figures 17 and 18, Appendix X is based on the UN Comtrade database. As mentioned in footnote 20 on page 43, depending on the source data was extracted from it can slightly vary. While the total discrepancy of imports from Nigeria amounts to $2.8bn according to the Competitiveness Map, it equals to $3.0bn according to the UN Comtrade database. In contrast to zero reported exports of Nigeria in 2016

according to the Competitiveness Map (Figures 17 and 18), the UN Comtrade database shows a reported export value of $5m.

Appendix X displays that the entire discrepancy of $3.0bn can be traced back to trade with petroleum products (SITC Code 33). While Switzerland reported from 2012 to 2016 $3.0bn imports of petroleum products from Nigeria, its African partner only declared exports of $1m.

Main Discrepancy: Swiss Commodity Traders / Error in Collection Process

In the case of Nigerian imports it can be assumed that petroleum is shipped via a third country before it arrives in Switzerland. Since Nigerian exporters may not know the final destination, they would indicate the third country over which the petroleum is shipped as *country of last known destination*. However, Swiss importers are probably aware that the country of origin is Nigeria, as the quality of the petroleum allows a fairly accurate determination of the origin of the products. (Appendix Z, Q18). Therefore, Switzerland reports larger imports than the respective mirror values of Nigeria.

Different Trade Systems

As explained in Section 4.2.1, the application of different trade systems may lead to mirror statistics discrepancies. Since Switzerland applies the special trade system (Part 5.1.3) and Nigeria the general one, this could therefore be the case in this example (United Nations, 2016k).

Imports and Exports Valuation

The different valuation of imports (CIF) and exports (FOB) may lead to minor bilateral trade asymmetries as explained in Section 4.1.1. Since according to the UN (2016k) Nigeria values its exports on a FOB basis and Switzerland its imports on a CIF basis (Part 5.1.2), the positive $DIF(I)^{Switzerland}$ (Figure 18) can probably be partly explained by these different valuation methods.

Currency Conversion

Switzerland reports its official trade statistics in Swiss francs (Part 5.1.1), whereas Nigeria in US dollars (United Nations, 2016k). Depending on the exchange rate used to convert Switzerland's statistics into US dollars, discrepancies may emerge (Part 4.1.3).

5.6.5 China

In Part 5.3.5 it was shown that the largest absolute mirror discrepancy from Switzerland's perspective as an exporter occurred due to trade with China. This also applies for the discrepancy from Switzerland's view as an importer; from 2012 to 2016, Switzerland has declared $45.7bn more imports from China than China has reported exports to Switzerland.
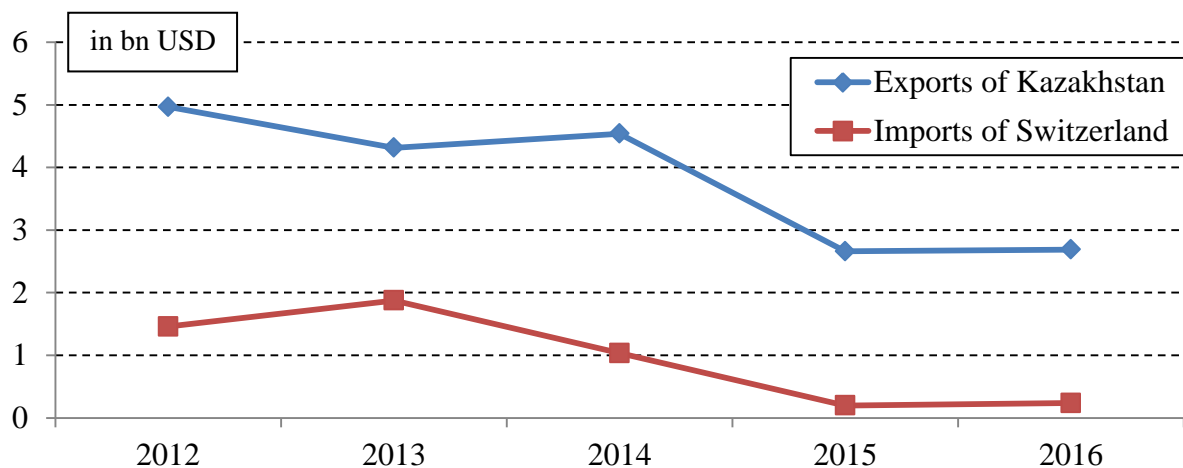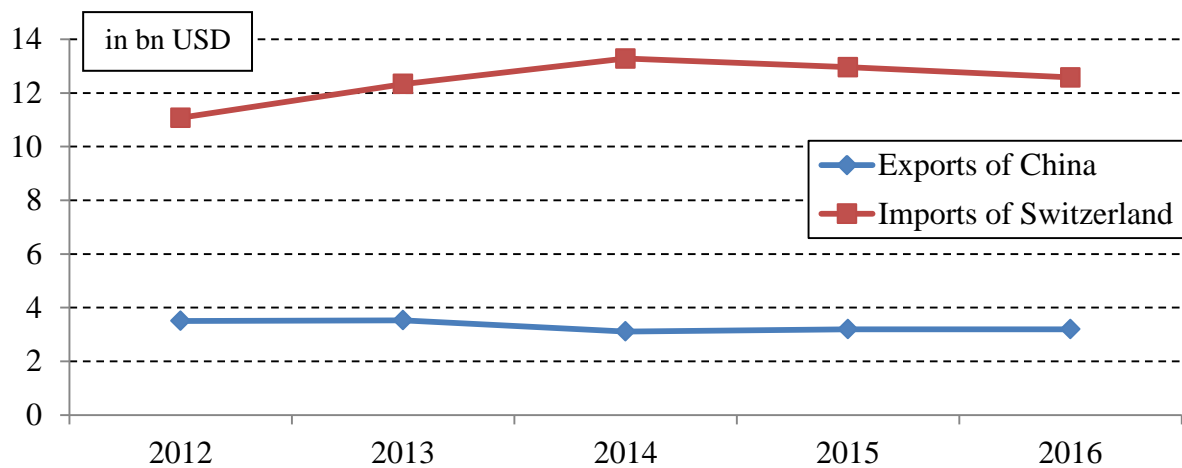
Figure 19: Discrepancy between Switzerland's reported Imports and China's reported Exports (International Trade Center, 2018)
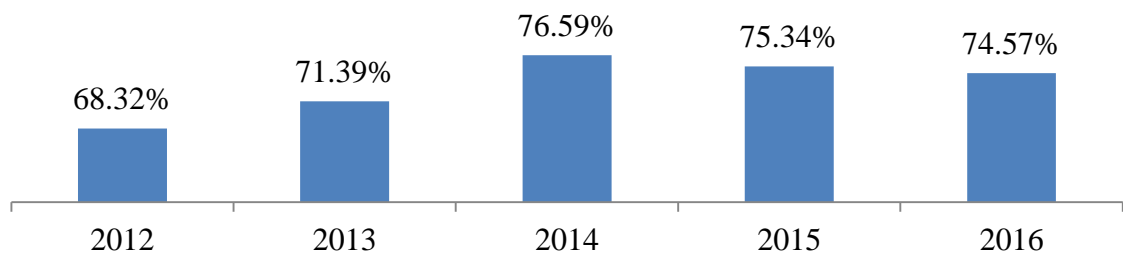
Figure 20: Percentage Difference (Switzerland – China with Switzerland as base) (International Trade Center, 2018)

Figures 19 and 20 show that on average, Switzerland reported each year $9.1bn more imports compared to China's declared exports. Thereby, the $DIF(I)^{Switzerland}$ was quite stable from 2012 to 2016, at around 70%, indicating that also the absolute discrepancy was roughly the same every year.

As shown above, China reported $45.7bn fewer exports to Switzerland compared to Switzerland's declared imports from China. However, from Switzerland's perspective as an exporter (Part 5.3.5), China has reported $103.8bn more imports from Switzerland than Switzerland has reported exports to China. Therefore, both countries,

Switzerland and China, generally reported fewer exports, whereas they declared more imports.

According to Appendix Y, China reports for almost every product group a lower export value than Switzerland's respective import value. Therefore, the total discrepancy of $45.7bn can be traced back to several product groups. Thereby, almost 50% of the total discrepancy was caused by the trade of telecommunication equipment (19.35%; SITC Code 76), office machines (15.98%; SITC Code 75), as well as clothing and accessories (14.45%; SITC Code 84). Numerous other product groups with relatively small trade volumes, titled as "Residual" in Appendix Y, accounted for 17.00% of the total mirror statistics discrepancy.

Main Discrepancy: Transshipments Over European Trade Hubs

According to the Federal Customs Authority (Appendix Z, Q19), the main cause of the discrepancy from Chinese imports may be transshipments over European trade hubs such as the Netherlands (port of Rotterdam), Germany (port of Hamburg) or Belgium (port of Antwerp). While Chinese exporters may not know transshipment is happening and therefore indicate the Netherlands, Germany or Belgium as *country of last known destination*, Switzerland is aware of the fact that these products originate from China. Since Switzerland therefore indicates China as *country of origin*, these discrepancies emerge. This case can be compared to Switzerland's exports to Singapore (Part 5.5.1), which are subsequently re-exported to China.

Different Trade Systems

As already mentioned in Section 5.5.5, China applies a different trade system than Switzerland, which could be another reason for the discrepancy between China's declared exports to Switzerland and Switzerland's declared imports from China (United Nations, 2016h).

Currency Conversion

As explained in Section 5.5.5, China reports its trade values in US dollars whereas Switzerland in Swiss francs. Depending on the exchange rate used to convert Switzerland's reported import values in US dollars, discrepancies in mirror statistics may emerge (United Nations, 2016h).

6 RECOMMENDATIONS

The following part aims to provide some practical ideas to overcome the problem of unbalanced IMTS and thus improve the quality of trade data.

6.1 Report Country of Consignment / Improve Recording of Transshipments

The case study of Switzerland has shown that one of the main causes of mirror statistics discrepancies are transshipments over certain trade hubs. To overcome this problem it would be essential to follow the UN's recommendation to record, in addition to the *country of last known destination* (exports) and *country of origin* (imports), the *country of consignment* for both imports and exports. As only a few countries have so far implemented this recommendation, the United Nations should provide certain incentives to obtain this additional information (Markhonko, 2014).

Moreover, it is recommended, especially for well-known trade hubs such as Singapore, the Netherlands, Spain, etc., to improve the quality of reporting re-exports (Javorsek, 2016). In the case of transshipments, the trading hub should be encouraged to report to the country from which the goods originate the correct final destination. Closer cooperation between importers, exporters, traders and statistical authorities could most likely minimize discrepancies in mirror statistics.

6.2 Understand different Trade Systems

Discrepancies occurring due to different trade systems (general vs. special) could be diminished if countries seek to understand the system used by its partners. It is therefore recommended to make efforts to obtain a clear overview of the trade systems used (Markhonko, 2014).

6.3 Additional Reporting of FOB Values for Imports

As mentioned above, almost all countries declare their imports on a CIF basis[22], while their export values are on an FOB basis[23]. Since imports additionally include freight and insurance costs, they are slightly higher than the respective export values and thus discrepancies occur. In order to reconcile these discrepancies, it is recommended to provide international organizations with FOB-type values of imported goods as supplementary information.

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[22] CIF basis: incl. transaction value of goods, insurance and freight costs (CIF = Cost, Insurance, Freight)
[23] FOB basis: incl. transaction value of goods (FOB = Free on Board)

6.4 Provide Trade Data in US Dollars

The Swiss case study has shown that the application of inaccurate exchange rates can lead to bilateral trade asymmetries. While certain countries report international trade data in their official currency, international organizations convert these values into US dollars by using a monthly average of the respective market rates. Since the monthly average rather than the exact exchange rate at the day of the import or export is used, mirror statistics discrepancies may occur. It is therefore recommended that all countries convert their IMTS into US dollars at the exchange rate prevailing at the time of the transaction and subsequently report them to international organizations.

6.5 Report Exports/Imports to/from OCWs

In order to avoid discrepancies due to reporting time lags caused by the temporary storage of certain products in OCWs, it is recommended to list OCWs as separate items in IMTS. For statistical purposes, OCWs should thereby be treated as individual country from or to which the goods are imported or exported.

6.6 Collaborate closely with Commodity Traders

As the Swiss case study shows, certain discrepancies can be attributed to trade in commodities (e.g. petroleum) by international commodity traders. Thereby, countries supplying commodities erroneously report the country in which the commodity trader is located as *country of last known destination*, even though these commodities are resold directly to another country. In order to detect such transactions it is recommended that statistical authorities cooperate closely with international commodity traders in their statistical territory. Once these transactions have been successfully identified, they should be reported to the statistical authority of the incorrectly reporting country to reconcile the discrepancy.

6.7 Conduct bilateral mirror statistics studies

It is recommended that statistical authorities increasingly conduct bilateral mirror statistics studies with their trading partners to offset prevailing trade asymmetries. These studies, which last about six months, aim to harmonize the methodological and conceptual collection process between trading partners in order to improve the quality of IMTS (Javorsek, 2016).

7   CONCLUSION

This thesis identified various causes (Chapter 4) that could lead to bilateral trade asymmetries. On the basis of the case study on Switzerland's trade figures (Chapter 5), it was found that the lack of knowledge among exporters about the final destination of goods and the differences in reporting on re-exports are probably the main problems for discrepancies in mirror statistics. As globalization progresses, re-exports are becoming increasingly important, making harmonized trade registration more difficult. Therefore, mirror statistics discrepancies can be relatively large which in turn affect the overall quality of trade statistics and thus may motivate ill-conceived economic policies.

In order to avoid a poorly thought-out trade related policy, it is important to reconcile bilateral trade asymmetries. Therefore, Chapter 6 aimed to provide practical ideas for overcoming unbalanced IMTS. Among other things, increased transnational cooperation between statistical authorities, importers, exporters and traders was identified as a key element for improving the overall quality of trade statistics. The recommendations in Chapter 6 are to be understood as possible approaches to solving the mirror discrepancy problem. However, the effectiveness of the proposed ideas can only be determined by their implementation.

The case study on Switzerland in Chapter 5 identified the largest bilateral trade asymmetries of Switzerland and attempted to explain the main causes of five import and five export mirror discrepancies. The explanations of the main discrepancies are conclusions based on information from an interview with the Deputy Head of the Diffusion and Analysis Section of the Federal Customs Office, Matthias Pfammatter (Appendix Z) and on UN data. However, the explanations cannot be considered final, as this would require bilateral mirror statistics studies between the Federal Customs Office and the statistical authority of its trading partners.

The analysis in Chapter 5 gives a good understanding how discrepancies in mirror statistics can occur. Based on the existing analysis, future research could consider following aspects, to obtain even more information on inaccurate trade data:

- Extend your analysis by including re-exports and re-imports. Focus on typical trade hubs such as the Netherlands and Singapore. Describe how they impact trade flows.

- Based on the rankings of the ten largest export (Table 1, p. 31) and import (Table 2, p. 43) discrepancies, perform detailed mirror statistics analyses for further countries.

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APPENDIX

Appendix A: Single Administrative Document (SAD)

Figure 21: Single Administrative Document (SAD) (United Nations, 2013, p. 20)

Appendix B: Selection of Partners for Swiss Exports

Leading Partners Exports Switzerland	Region	Export Value reported by Switzerland in 2016 USD ('000)
Germany	Europe	43,704,316
United States of America	North America	36,995,891
United Kingdom	Europe	32,666,926
China	Asia Pacific	27,332,174
Hong Kong, China	Asia Pacific	18,589,056
France	Europe	17,744,756
Italy	Europe	14,899,772
India	Asia Pacific	14,641,611
Japan	Asia Pacific	7,700,782
Austria	Europe	7,563,734
Singapore	Asia Pacific	6,516,775
Belgium	Europe	6,215,692
Spain	Europe	5,700,207
Netherlands	Europe	5,125,176
Canada	North America	3,399,149
Korea, Republic of	Asia Pacific	2,357,939
Saudi Arabia	MENA	2,284,090
Australia	Asia Pacific	2,369,550
Turkey	Europe	2,506,178
Poland	Europe	1,437,512
Thailand	Asia Pacific	4,148,693
Russian	Europe	1,951,466
Brazil	Latin America	1,902,751
Taipei, Chinese	Asia Pacific	1,568,846
Czech Republic	Europe	1,401,502
Malaysia	Asia Pacific	1,718,787
Sweden	Europe	1,099,427
Mexico	Latin America	1,657,910
Israel	MENA	4,288,102
Ireland	Europe	1,586,734
Hungary	Europe	657,021
Denmark	Europe	666,095
Egypt	MENA	611,480
Portugal	Europe	298,413
Finland	Europe	460,171
Greece	Europe	459,913
Norway	Europe	881,869
South Africa	Sub-Saharan Africa	724,813
Romania	Europe	460,148
Argentina	Latin America	517,080
Lebanon	MENA	399,659

Slovakia	Europe	632,499
Colombia	Latin America	386,974
Indonesia	Asia Pacific	723,730
Kuwait	MENA	547,184
Jordan	MENA	305,252
Slovenia	Europe	355,472
Bulgaria	Europe	213,741
Philippines	Asia Pacific	408,794
Pakistan	Asia Pacific	250,503
Algeria	MENA	291,555
Luxembourg	Europe	227,318
Morocco	MENA	262,822
Chile	Latin America	260,156
Bahrain	MENA	255,214
Oman	MENA	110,512
Croatia	Europe	185,681
Uruguay	Latin America	31,901
Sri Lanka	Asia Pacific	274,209
New Zealand	Asia Pacific	254,571
Serbia	Europe	205,115
Costa Rica	Latin America	145,170
Latvia	Europe	140,780
Estonia	Europe	176,651
Peru	Latin America	156,012
Kazakhstan	Asia Pacific	110,020
Nigeria	Sub-Saharan Africa	113,461
Ecuador	Latin America	113,089
United Arabic Emirates*	MENA	0
69 Countries	**6 Regions**	**294,350,552**

*Due to trade volume from 2012 to 2015 included in analysis (compare footnote 14, in Part 5.3.2 on p. 27)

Table 3: Selection of Partners for Swiss Exports (International Trade Center, 2018)

Appendix C: Selection of Partners for Swiss Imports

Leading Partners Imports Switzerland	Region	Import Value reported by Switzerland in 2016 USD ('000)
Germany	Europe	52,014,676
United States of America	North America	24,037,962
Italy	Europe	19,818,461
United Kingdom	Europe	19,086,041
France	Europe	16,413,026
China	Asia Pacific	12,576,564
Hong Kong, China	Asia Pacific	8,219,924
Austria	Europe	7,891,461
Ireland	Europe	7,808,394
Spain	Europe	5,164,306
Netherlands	Europe	5,062,183
Thailand	Asia Pacific	5,054,483
Belgium	Europe	4,849,608
Japan	Asia Pacific	3,585,771
Singapore	Asia Pacific	3,417,880
Turkey	Europe	3,073,288
Peru	Latin America	2,465,338
Indonesia	Asia Pacific	2,406,302
Ghana	Sub-Saharan Africa	2,400,279
Czech Republic	Europe	2,319,942
Poland	Europe	2,013,511
Russian	Europe	1,673,182
India	Asia Pacific	1,509,600
Sweden	Europe	1,488,223
Burkina Faso	Sub-Saharan Africa	1,340,263
Brazil	Latin America	1,245,664
Argentina	Latin America	1,155,548
South Africa	Sub-Saharan Africa	1,114,920
Hungary	Europe	1,104,941
Taipei, Chinese	Asia Pacific	1,075,044
Canada	North America	1,044,149
Mexico	Latin America	989,397
Malaysia	Asia Pacific	969,658
Finland	Europe	951,732
Slovakia	Europe	928,266
Australia	Asia Pacific	891,507
Portugal	Europe	871,856
Korea, Republic of	Asia Pacific	848,430
Denmark	Europe	763,205
Israel	MENA	696,860
Tanzania	Sub-Saharan Africa	633,635

Romania	Europe	606,191
Chile	Latin America	528,602
Colombia	Latin America	524,613
Philippines	Asia Pacific	516,173
Egypt	MENA	477,128
Slovenia	Europe	449,837
Saudi Arabia	MENA	449,289
Norway	Europe	400,690
Cambodia	Asia Pacific	356,497
Nigeria	Sub-Saharan Africa	335,454
Senegal	Sub-Saharan Africa	282,073
Luxembourg	Europe	270,623
Bulgaria	Europe	266,222
Kazakhstan	Asia Pacific	236,559
Mauritania	Sub-Saharan Africa	231,387
Morocco	MENA	229,184
Lebanon	MENA	219,920
Ethiopia	Sub-Saharan Africa	218,162
Croatia	Europe	181,979
Greece	Europe	163,499
Sri Lanka	Asia Pacific	160,532
Serbia	Europe	143,351
Lithuania	Europe	141,510
Pakistan	Asia Pacific	125,760
Costa Rica	Latin America	104,224
United Arabic Emirates*	6 Regions	0
67 Countries	**6 Regions**	**238,594,939**

*Due to trade volume from 2012 to 2015 included in analysis (compare footnote 14, Part 5.3.2 on p. 27)

Table 4: Selection of Partners for Swiss Imports (International Trade Center, 2018)

Appendix D: Europe Trade Discrepancy; Exports of Switzerland

Leading Partners Exports Switzerland to Europe	Imports from Switzerland $M^{Switzerland-Europe}$ USD ('000)	Exports to European Partner $E^{Switzerland-Europe}$ USD ('000)	Percentage Difference $DIF(E)^{Switzerland}$
2012-2016			
Germany	252,602,701	224,460,997	11.14%
United Kingdom	85,433,047	103,581,877	-21.24%
France	81,096,658	98,628,241	-21.62%
Italy	65,633,100	84,276,680	-28.41%
Austria	49,503,189	41,477,107	16.21%
Belgium	26,243,408	29,612,017	-12.84%
Spain	17,948,447	29,386,475	-63.73%
Netherlands	15,710,023	27,193,666	-73.10%
Turkey	23,585,741	23,314,356	1.15%
Poland	8,657,864	10,314,853	-19.14%
Russia	13,384,699	14,082,962	-5.22%
Czech Republic	7,505,209	7,868,000	-4.83%
Sweden	6,279,606	7,565,133	-20.47%
Ireland	6,331,592	5,753,702	9.13%
Hungary	3,855,727	4,651,752	-20.65%
Denmark	4,239,510	4,469,631	-5.43%
Portugal	3,352,759	3,278,640	2.21%
Finland	3,204,362	3,489,731	-8.91%
Greece	3,508,569	3,903,235	-11.25%
Norway	5,098,422	5,060,659	0.74%
Romania	3,313,658	3,428,965	-3.48%
Slovakia	2,727,272	2,819,344	-3.38%
Slovenia	1,938,497	2,035,933	-5.03%
Bulgaria	1,438,217	1,554,791	-8.11%
Luxembourg	1,501,176	1,494,160	0.47%
Croatia	1,405,710	1,112,549	20.86%
Serbia	1,146,676	1,103,240	3.79%
Latvia	673,609	706,122	-4.83%
Estonia	864,992	873,538	-0.99%
Total	**698,184,440**	**747,498,356**	**-7.06%**
2016			
Germany	49,642,834	43,704,316	11.96%
United Kingdom	26,607,841	32,666,926	-22.77%
France	15,660,344	17,744,756	-13.31%
Italy	11,729,684	14,899,772	-27.03%
Austria	8,827,868	7,563,734	14.32%
Belgium	4,952,263	6,215,692	-25.51%
Spain	3,905,376	5,700,207	-45.96%

Netherlands	3,435,378	5,125,176	-49.19%
Turkey	2,355,446	2,506,178	-6.40%
Poland	2,220,526	1,437,512	35.26%
Russia	2,069,602	1,951,466	5.71%
Czech Republic	1,539,476	1,401,502	8.96%
Sweden	1,474,134	1,099,427	25.42%
Ireland	1,033,637	1,586,734	-53.51%
Hungary	949,582	657,021	30.81%
Denmark	937,889	666,095	28.98%
Portugal	823,137	298,413	63.75%
Finland	813,031	460,171	43.40%
Greece	793,532	459,913	42.04%
Norway	722,172	881,869	-22.11%
Romania	713,966	460,148	35.55%
Slovakia	577,041	632,499	-9.61%
Slovenia	425,756	355,472	16.51%
Bulgaria	377,085	213,741	43.32%
Luxembourg	320,313	227,318	29.03%
Croatia	252,118	185,681	26.35%
Serbia	208,698	205,115	1.72%
Latvia	173,421	140,780	18.82%
Estonia	173,062	176,651	-2.07%
Total	**143,715,212**	**149,624,285**	**-4.11%**
2015			
Germany	47,798,575	41,453,775	13.27%
United Kingdom	10,226,342	13,690,986	-33.88%
France	15,968,398	17,648,246	-10.52%
Italy	11,928,546	15,609,589	-30.86%
Austria	9,272,637	7,872,708	15.10%
Belgium	4,831,590	5,867,954	-21.45%
Spain	3,413,235	5,636,728	-65.14%
Netherlands	2,909,872	5,041,473	-73.25%
Turkey	2,449,584	2,603,489	-6.28%
Poland	1,529,119	2,200,637	-43.92%
Russian	1,994,698	2,410,558	-20.85%
Czech Republic	1,437,726	1,618,917	-12.60%
Sweden	1,130,317	1,547,020	-36.87%
Ireland	1,500,665	1,012,741	32.51%
Hungary	662,232	1,128,719	-70.44%
Denmark	651,919	895,746	-37.40%
Portugal	292,867	827,716	-182.63%
Finland	447,104	675,242	-51.03%
Greece	477,849	830,592	-73.82%
Norway	896,014	822,148	8.24%

Romania	497,322	694,419	-39.63%
Slovakia	540,696	541,104	-0.08%
Slovenia	361,978	432,470	-19.47%
Bulgaria	209,858	369,682	-76.16%
Luxembourg	215,068	250,237	-16.35%
Croatia	185,695	216,955	-16.83%
Serbia	284,926	287,887	-1.04%
Latvia	117,085	147,835	-26.26%
Estonia	153,561	150,537	1.97%
Total	**122,385,478**	**132,486,110**	**-8.25%**
2014			
Germany	53,685,132	47,334,109	11.83%
United Kingdom	10,638,110	13,794,166	-29.67%
France	16,848,096	19,039,516	-13.01%
Italy	13,794,251	17,660,874	-28.03%
Austria	10,224,325	8,551,398	16.36%
Belgium	5,826,914	6,388,531	-9.64%
Spain	3,801,975	6,389,508	-68.06%
Netherlands	2,984,701	5,720,457	-91.66%
Turkey	4,825,430	4,902,076	-1.59%
Poland	1,761,285	2,411,659	-36.93%
Russian	3,271,915	3,174,549	2.98%
Czech Republic	1,514,732	1,647,713	-8.78%
Sweden	1,184,974	1,625,671	-37.19%
Ireland	1,660,298	1,284,561	22.63%
Hungary	689,664	1,167,902	-69.34%
Denmark	778,784	1,040,965	-33.67%
Portugal	353,259	915,802	-159.24%
Finland	545,222	858,594	-57.48%
Greece	617,529	981,118	-58.88%
Norway	1,223,997	1,066,456	12.87%
Romania	645,359	863,813	-33.85%
Slovakia	638,860	616,739	3.46%
Slovenia	415,512	497,078	-19.63%
Bulgaria	232,180	389,952	-67.95%
Luxembourg	183,331	262,766	-43.33%
Croatia	251,515	205,902	18.14%
Serbia	244,071	224,773	7.91%
Latvia	122,652	151,033	-23.14%
Estonia	167,502	167,774	-0.16%
Total	**139,131,575**	**149,335,455**	**-7.33%**
2013			
Germany	52,015,405	45,187,329	13.13%
United Kingdom	10,399,970	13,269,871	-27.60%

France	16,986,001	20,793,694	-22.42%
Italy	14,098,684	18,189,489	-29.02%
Austria	10,538,259	8,920,212	15.35%
Belgium	5,565,895	5,821,019	-4.58%
Spain	3,454,011	5,765,126	-66.91%
Netherlands	3,141,988	5,785,352	-84.13%
Turkey	9,647,977	8,900,882	7.74%
Poland	1,625,357	2,245,775	-38.17%
Russian	3,009,362	3,388,500	-12.60%
Czech Republic	1,519,834	1,586,569	-4.39%
Sweden	1,171,435	1,588,584	-35.61%
Ireland	905,642	1,114,304	-23.04%
Hungary	920,719	630,336	31.54%
Denmark	1,068,783	829,891	22.35%
Portugal	1,154,065	372,540	67.72%
Finland	846,143	535,195	36.75%
Greece	980,759	617,123	37.08%
Norway	1,029,022	1,173,883	-14.08%
Romania	856,612	560,018	34.62%
Slovakia	561,070	553,320	1.38%
Slovenia	450,752	371,627	17.55%
Bulgaria	351,267	263,054	25.11%
Luxembourg	409,480	236,937	42.14%
Croatia	251,690	290,262	-15.33%
Serbia	202,238	205,455	-1.59%
Latvia	147,722	111,893	24.25%
Estonia	204,157	205,181	-0.50%
Total	**143,514,299**	**149,513,421**	**-4.18%**
2012			
Germany	49,460,755	46,781,468	5.42%
United Kingdom	27,560,784	30,159,928	-9.43%
France	15,633,819	23,402,029	-49.69%
Italy	14,081,935	17,916,956	-27.23%
Austria	10,640,100	8,569,055	19.46%
Belgium	5,066,746	5,318,821	-4.98%
Spain	3,373,850	5,894,906	-74.72%
Netherlands	3,238,084	5,521,208	-70.51%
Turkey	4,307,304	4,401,731	-2.19%
Poland	1,521,577	2,019,270	-32.71%
Russian	3,039,122	3,157,889	-3.91%
Czech Republic	1,493,441	1,613,299	-8.03%
Sweden	1,318,746	1,704,431	-29.25%
Ireland	1,231,350	755,362	38.66%
Hungary	633,530	1,067,774	-68.54%

Denmark	802,135	1,036,934	-29.27%
Portugal	729,431	864,169	-18.47%
Finland	552,862	960,529	-73.74%
Greece	638,900	1,014,489	-58.79%
Norway	1,227,217	1,116,303	9.04%
Romania	600,399	850,567	-41.67%
Slovakia	409,605	475,682	-16.13%
Slovenia	284,499	379,286	-33.32%
Bulgaria	267,827	318,362	-18.87%
Luxembourg	372,984	516,902	-38.59%
Croatia	464,692	213,749	54.00%
Serbia	206,743	180,010	12.93%
Latvia	112,729	154,581	-37.13%
Estonia	166,710	173,395	-4.01%
Total	**149,437,876**	**166,539,085**	**-11.44%**

Table 5: Europe Trade Discrepancy; Exports of Switzerland (International Trade Center, 2018)

Appendix E: Europe Trade Discrepancy; Imports of Switzerland

Leading Partners Imports Switzerland from Europe	Imports from European Partner $M^{Europe-Switzerland}$ *USD ('000)*	Exports to Switzerland $E^{Europe-Switzerland}$ *USD ('000)*	Percentage Difference $DIF(I)^{Switzerland}$
2012-2016			
Germany	287,667,304	301,459,931	-4.79%
Italy	115,318,630	124,960,250	-8.36%
United Kingdom	168,966,395	176,492,037	-4.45%
France	96,775,236	84,456,246	12.73%
Austria	42,394,042	44,732,920	-5.52%
Ireland	37,835,388	34,032,928	10.05%
Spain	28,363,465	24,997,127	11.87%
Netherlands	29,578,817	37,060,439	-25.29%
Belgium	29,215,297	31,674,743	-8.42%
Turkey	16,663,865	14,745,177	11.51%
Czech Republic	12,036,293	12,648,119	-5.08%
Poland	9,248,263	8,955,125	3.17%
Russian Federation	14,458,075	28,339,858	-96.01%
Sweden	8,948,913	8,984,720	-0.40%
Hungary	5,534,344	4,973,602	10.13%
Finland	5,184,658	3,100,824	40.19%
Slovakia	4,718,044	6,365,258	-34.91%
Portugal	4,543,843	2,744,170	39.61%
Denmark	4,216,705	4,422,741	-4.89%
Romania	3,009,101	1,850,392	38.51%
Slovenia	2,179,201	2,170,672	0.39%
Norway	2,169,287	2,746,001	-26.59%
Luxembourg	1,726,224	1,178,932	31.70%
Bulgaria	1,301,553	798,834	38.62%
Croatia	761,554	711,521	6.57%
Greece	853,426	766,481	10.19%
Serbia	599,605	495,673	17.33%
Lithuania	573,651	490,882	14.43%
Total	**934,841,179**	**966,355,603**	**-3.37%**
2016			
Germany	52,014,676	56,915,902	-9.42%
Italy	19,818,461	21,052,875	-6.23%
United Kingdom	19,086,041	20,018,387	-4.88%
France	16,413,026	16,921,673	-3.10%
Austria	7,891,461	8,550,131	-8.35%
Ireland	7,808,394	6,988,952	10.49%
Spain	5,164,306	4,432,048	14.18%
Netherlands	5,062,183	7,052,689	-39.32%

Belgium	4,849,608	5,860,674	-20.85%
Turkey	3,073,288	2,680,881	12.77%
Czech Republic	2,319,942	2,363,951	-1.90%
Poland	2,013,511	1,931,792	4.06%
Russian Federation	1,673,182	3,109,875	-85.87%
Sweden	1,488,223	1,657,958	-11.41%
Hungary	1,104,941	939,461	14.98%
Finland	951,732	706,251	25.79%
Slovakia	928,266	1,231,516	-32.67%
Portugal	871,856	591,933	32.11%
Denmark	763,205	798,076	-4.57%
Romania	606,191	393,675	35.06%
Slovenia	449,837	492,618	-9.51%
Norway	400,690	507,707	-26.71%
Luxembourg	270,623	258,549	4.46%
Bulgaria	266,222	74,208	72.13%
Croatia	181,979	147,505	18.94%
Greece	163,499	148,968	8.89%
Serbia	143,351	110,917	22.63%
Lithuania	141,510	116,723	17.52%
Total	**155,920,204**	**166,055,895**	**-6.50%**
2015			
Germany	52,236,972	55,456,725	-6.16%
Italy	20,313,439	22,119,238	-8.89%
United Kingdom	32,449,509	34,021,580	-4.84%
France	16,712,576	15,334,496	8.25%
Austria	7,835,033	8,558,607	-9.24%
Ireland	7,335,593	6,761,578	7.83%
Spain	4,745,616	4,335,790	8.64%
Netherlands	5,199,284	6,905,644	-32.82%
Belgium	4,799,700	5,303,327	-10.49%
Turkey	6,102,749	5,680,786	6.91%
Czech Republic	2,465,058	2,465,049	0.00%
Poland	1,802,296	1,784,475	0.99%
Russian Federation	1,651,082	2,542,565	-53.99%
Sweden	1,670,083	1,606,168	3.83%
Hungary	1,128,815	938,193	16.89%
Finland	899,220	637,525	29.10%
Slovakia	847,028	1,232,087	-45.46%
Portugal	872,108	508,893	41.65%
Denmark	779,805	791,995	-1.56%
Romania	584,708	343,535	41.25%
Slovenia	417,723	460,314	-10.20%
Norway	355,754	406,866	-14.37%

Luxembourg	230,469	170,892	25.85%
Bulgaria	220,707	144,424	34.56%
Croatia	177,250	148,253	16.36%
Greece	154,822	145,792	5.83%
Serbia	112,775	89,968	20.22%
Lithuania	111,497	106,694	4.31%
Total	**172,211,671**	**179,001,459**	**-3.94%**
2014			
Germany	59,376,752	62,603,291	-5.43%
Italy	22,594,124	25,294,239	-11.95%
United Kingdom	33,710,336	35,132,589	-4.22%
France	18,116,616	17,202,846	5.04%
Austria	9,666,594	9,705,355	-0.40%
Ireland	7,857,477	6,978,663	11.18%
Spain	5,360,335	4,753,304	11.32%
Netherlands	6,088,620	7,963,705	-30.80%
Belgium	5,025,596	6,368,871	-26.73%
Turkey	3,626,884	3,219,460	11.23%
Czech Republic	2,504,737	2,731,967	-9.07%
Poland	1,914,039	1,882,944	1.62%
Russian Federation	3,314,835	3,574,065	-7.82%
Sweden	1,781,655	1,704,173	4.35%
Hungary	1,200,584	1,055,407	12.09%
Finland	1,114,130	545,713	51.02%
Slovakia	955,513	1,429,815	-49.64%
Portugal	895,869	570,787	36.29%
Denmark	903,907	1,036,085	-14.62%
Romania	673,561	398,798	40.79%
Slovenia	581,095	502,540	13.52%
Norway	384,397	537,795	-39.91%
Luxembourg	595,090	426,217	28.38%
Bulgaria	246,035	162,648	33.89%
Croatia	149,784	164,322	-9.71%
Greece	170,647	148,442	13.01%
Serbia	122,897	99,194	19.29%
Lithuania	140,993	122,453	13.15%
Total	**189,073,102**	**196,315,688**	**-3.83%**
2013			
Germany	59,805,444	63,102,154	-5.51%
Italy	24,881,040	27,061,454	-8.76%
United Kingdom	69,769,711	71,112,257	-1.92%
France	21,263,924	17,360,670	18.36%
Austria	8,698,848	9,200,407	-5.77%
Ireland	7,618,360	6,790,623	10.87%

Spain	6,425,400	5,559,824	13.47%
Netherlands	6,409,658	7,558,896	-17.93%
Belgium	6,055,655	7,106,699	-17.36%
Turkey	1,471,253	1,029,548	30.02%
Czech Republic	2,371,078	2,523,841	-6.44%
Poland	1,794,950	1,711,422	4.65%
Russian Federation	4,736,386	8,656,003	-82.76%
Sweden	2,071,048	2,006,597	3.11%
Hungary	1,118,082	1,067,124	4.56%
Finland	1,028,073	562,781	45.26%
Slovakia	1,050,359	1,388,865	-32.23%
Portugal	1,074,570	556,671	48.20%
Denmark	872,708	907,047	-3.93%
Romania	603,093	358,084	40.63%
Slovenia	391,366	392,516	-0.29%
Norway	438,039	528,697	-20.70%
Luxembourg	396,821	169,524	57.28%
Bulgaria	285,466	210,899	26.12%
Croatia	139,478	147,191	-5.53%
Greece	186,550	153,775	17.57%
Serbia	116,929	103,688	11.32%
Lithuania	99,431	83,448	16.07%
Total	**231,173,720**	**237,410,705**	**-2.70%**
2012			
Germany	64,233,460	63,381,859	1.33%
Italy	27,711,566	29,432,444	-6.21%
United Kingdom	13,950,798	16,207,224	-16.17%
France	24,269,094	17,636,561	27.33%
Austria	8,302,106	8,718,420	-5.01%
Ireland	7,215,564	6,513,112	9.74%
Spain	6,667,808	5,916,161	11.27%
Netherlands	6,819,072	7,579,505	-11.15%
Belgium	8,484,738	7,035,172	17.08%
Turkey	2,389,691	2,134,502	10.68%
Czech Republic	2,375,478	2,563,311	-7.91%
Poland	1,723,467	1,644,492	4.58%
Russian Federation	3,082,590	10,457,350	-239.24%
Sweden	1,937,904	2,009,824	-3.71%
Hungary	981,922	973,417	0.87%
Finland	1,191,503	648,554	45.57%
Slovakia	936,878	1,082,975	-15.59%
Portugal	829,440	515,886	37.80%
Denmark	897,080	889,538	0.84%
Romania	541,548	356,300	34.21%

Slovenia	339,180	322,684	4.86%
Norway	590,407	764,936	-29.56%
Luxembourg	233,221	153,750	34.08%
Bulgaria	283,123	206,655	27.01%
Croatia	113,063	104,250	7.79%
Greece	177,908	169,504	4.72%
Serbia	103,653	91,906	11.33%
Lithuania	80,220	61,564	23.26%
Total	**186,462,482**	**187,571,856**	**-0.59%**

Table 6: Europe Trade Discrepancy; Imports of Switzerland (International Trade Center, 2018)

Appendix F: MENA Trade Discrepancy; Exports of Switzerland

Leading Partners Exports Switzerland to MENA	Imports from Switzerland $M^{Switzerland-MENA}$ *USD ('000)*	Exports to MENA Partner $E^{Switzerland-MENA}$ *USD ('000)*	Percentage Difference $DIF(E)^{Switzerland}$
2012-2016			
Saudi Arabia	19,568,923	22,001,890	-12.43%
Israel	22,355,902	5,777,975	74.15%
Egypt	4,406,741	4,919,360	-11.63%
Lebanon	2,825,445	3,540,149	-25.30%
Kuwait	2,657,582	2,347,514	11.67%
Jordan	2,305,146	2,651,864	-15.04%
Algeria	2,903,748	2,261,729	22.11%
Morocco	1,346,183	1,481,971	-10.09%
Bahrain	1,326,989	1,353,266	-1.98%
Oman	937,706	1,151,713	-22.82%
UAE*	28,897,270	26,475,753	8.38%
Total	**60,634,365**	**47,487,431**	**21.68%**
2016			
Saudi Arabia	2,284,090	2,825,980	-23.72%
Israel	4,288,102	1,139,591	73.42%
Egypt	611,480	884,027	-44.57%
Lebanon	399,659	646,881	-61.86%
Kuwait	547,184	464,088	15.19%
Jordan	305,252	448,165	-46.82%
Algeria	291,555	338,558	-16.12%
Morocco	262,822	302,540	-15.11%
Bahrain	255,214	293,495	-15.00%
Oman	110,512	283,186	-156.25%
UAE*	0	0	0.00%
Total	**9,355,870**	**7,626,511**	**18.48%**
2015			
Saudi Arabia	3,979,952	4,984,027	-25.23%
Israel	4,426,081	1,158,887	73.82%
Egypt	759,826	932,930	-22.78%
Lebanon	425,958	680,107	-59.67%
Kuwait	578,305	468,994	18.90%
Jordan	663,647	737,657	-11.15%
Algeria	469,865	378,314	19.48%
Morocco	266,316	298,880	-12.23%
Bahrain	252,178	255,482	-1.31%
Oman	176,549	218,088	-23.53%
UAE*	4,665,880	5,314,015	-13.89%
Total	**11,998,677**	**10,113,366**	**15.71%**

2014			
Saudi Arabia	4,676,803	5,007,823	-7.08%
Israel	5,189,867	1,182,735	77.21%
Egypt	903,907	1,124,410	-24.39%
Lebanon	533,786	844,746	-58.26%
Kuwait	606,219	438,444	27.68%
Jordan	534,804	675,543	-26.32%
Algeria	1,145,661	530,037	53.74%
Morocco	301,679	338,485	-12.20%
Bahrain	248,559	299,474	-20.48%
Oman	176,268	219,701	-24.64%
UAE*	7,641,711	6,443,283	15.68%
Total	**14,317,553**	**10,661,398**	**25.54%**
2013			
Saudi Arabia	5,090,790	5,279,273	-3.70%
Israel	4,397,265	1,222,337	72.20%
Egypt	1,400,288	1,224,661	12.54%
Lebanon	959,393	640,229	33.27%
Kuwait	471,054	586,783	-24.57%
Jordan	653,203	516,019	21.00%
Algeria	456,136	591,669	-29.71%
Morocco	283,895	247,726	12.74%
Bahrain	335,001	243,008	27.46%
Oman	255,936	188,703	26.27%
UAE	10,592,055	9,279,331	12.39%
Total	**14,302,961**	**10,740,408**	**24.91%**
2012			
Saudi Arabia	3,537,288	3,904,787	-10.39%
Israel	4,054,587	1,074,425	73.50%
Egypt	731,240	753,332	-3.02%
Lebanon	506,649	728,186	-43.73%
Kuwait	454,820	389,205	14.43%
Jordan	148,240	274,480	-85.16%
Algeria	540,531	423,151	21.72%
Morocco	231,471	294,340	-27.16%
Bahrain	236,037	261,807	-10.92%
Oman	218,441	242,035	-10.80%
UAE*	5,997,624	5,439,124	9.31%
Total	**10,659,304**	**8,345,748**	**21.70%**

*Due to trade volume from 2012 to 2015 included in analysis (compare footnote 14, Part 5.3.2 on p. 27)

Table 7: MENA Trade Discrepancy; Exports of Switzerland (International Trade Center, 2018)

Appendix G: MENA Trade Discrepancy; Imports of Switzerland

Leading partners Imports Switzerland MENA	Imports from MENA partners $M^{MENA\text{-}Switzerland})$ USD ('000)	Exports to Switzerland $E^{MENA\text{-}Switzerland}$ USD ('000)	Percentage Difference $DIF(I)^{Switzerland}$ $Dif(E)^{MENA\ partners}$
2012-2016			
Israel	3,296,151	6,892,811	-109.12%
Egypt	1,185,878	1,194,927	-0.76%
Saudi Arabia	1,343,392	852,238	36.56%
Morocco	1,374,233	825,908	39.90%
Lebanon	2,060,118	967,154	53.05%
UAE*	27,340,095	32,051,352	-17.23%
Total	**36,599,867**	**42,784,390**	**-16.90%**
2016			
Israel	696,860	1,466,214	-110.40%
Egypt	477,128	492,673	-3.26%
Saudi Arabia	449,289	254,383	43.38%
Morocco	229,184	139,362	39.19%
Lebanon	219,920	94,135	57.20%
UAE*	0	0	0.00%
Total	**2,072,381**	**2,446,767**	**-18.07%**
2015			
Israel	648,805	1,495,381	-130.48%
Egypt	79,745	224,194	-181.14%
Saudi Arabia	137,258	108,942	20.63%
Morocco	231,172	117,170	49.31%
Lebanon	229,426	64,191	72.02%
UAE*	3,870,616	4,131,837	-6.75%
Total	**5,197,022**	**6,141,715**	**-18.18%**
2014			
Israel	707,298	1,424,628	-101.42%
Egypt	111,502	35,460	68.20%
Saudi Arabia	183,404	87,994	52.02%
Morocco	250,387	142,268	43.18%
Lebanon	298,574	86,533	71.02%
UAE	3,314,090	5,601,371	-69.02%
Total	**4,865,255**	**7,378,254**	**-51.65%**
2013			
Israel	648,941	1,375,497	-111.96%
Egypt	154,036	98,058	36.34%
Saudi Arabia	273,832	124,062	54.69%
Morocco	320,739	198,878	37.99%
Lebanon	474,505	174,777	63.17%
UAE*	3,131,422	4,299,555	-37.30%

Total	**5,003,475**	**6,270,827**	**-25.33%**
2012			
Israel	594,247	1,131,091	-90.34%
Egypt	363,467	344,542	5.21%
Saudi Arabia	299,609	276,857	7.59%
Morocco	342,751	228,230	33.41%
Lebanon	837,693	547,518	34.64%
UAE*	17,023,967	18,018,589	-5.84%
Total	**19,461,734**	**20,546,827**	**-5.58%**

*Due to trade volume from 2012 to 2015 included in analysis (compare footnote 14, Part 5.3.2 on p. 27)

Table 8: MENA Trade Discrepancy; Imports of Switzerland (International Trade Center, 2018)

Appendix H: Sub-Saharan Africa Trade Discrepancy; Exports of Switzerland

Leading partners Exports	Imports from Switzerland	Exports to Sub-Saharan African partner	Percentage Difference
Switzerland Sub-Saharan Africa	$M^{Switzerland-S.S-Africa}$ *USD ('000)*	$E^{Switzerland-S.S-Africa}$ *USD ('000)*	$DIF(E)^{Switzerland}$
2012-2016			
South Africa	3,794,596	3,879,726	-2.24%
Nigeria	1,131,456	942,818	16.67%
Total	**4,926,052**	**4,822,544**	**2.10%**
2016			
South Africa	714,766	724,813	-1.41%
Nigeria	144,710	113,461	21.59%
Total	**859,476**	**838,274**	**2.47%**
2015			
South Africa	642,539	706,940	-10.02%
Nigeria	161,293	191,137	-18.50%
Total	**803,832**	**898,077**	**-11.72%**
2014			
South Africa	823,230	789,850	4.05%
Nigeria	276,423	262,707	4.96%
Total	**1,099,653**	**1,052,557**	**4.28%**
2013			
South Africa	809,122	872,970	-7.89%
Nigeria	249,167	139,239	44.12%
Total	**1,058,289**	**1,012,209**	**4.35%**
2012			
South Africa	804,939	785,153	2.46%
Nigeria	299,863	236,274	21.21%
Total	**1,104,802**	**1,021,427**	**7.55%**

Table 9: Sub-Saharan Africa Trade Discrepancy; Exports of Switzerland (International Trade Center, 2018)

Appendix I: Sub-Saharan Africa Trade Discrepancy; Imports of Switzerland

Leading partners Imports Switzerland from Sub-Saharan Africa	Imports from Sub-Saharan African partners $M^{S.S.-Africa-Switzerland}$ *USD ('000)*	Exports to Switzerland $E^{S.S.-Africa-Switzerland}$ *USD ('000)*	Percentage Difference $DIF(I)^{Switzerland}$
2012-2016			
Ghana	5,746,000	4,253,050	25.98%
Burkina Faso	6,324,670	6,800,195	-7.52%
South Africa	9,034,717	7,056,101	21.90%
Tanzania	2,164,775	2,124,657	1.85%
Nigeria	3,082,045	316,173	89.74%
Senegal	1,428,242	1,362,935	4.57%
Mauritania	1,469,925	1,526,652	-3.86%
Ethiopia	1,365,303	727,448	46.72%
Total	**30,615,677**	**24,167,211**	**21.06%**
2016			
Ghana	2,400,279	1,868,671	22.15%
Burkina Faso	1,340,263	1,497,142	-11.71%
South Africa	1,114,920	866,335	22.30%
Tanzania	633,635	618,479	2.39%
Nigeria	335,454	0	100.00%
Senegal	282,073	268,398	4.85%
Mauritania	231,387	250,140	-8.10%
Ethiopia	218,162	110,694	49.26%
Total	6,556,173	5,479,859	16.42%
2015			
Ghana	0	0	0.00%
Burkina Faso	1,004,973	1,101,107	-9.57%
South Africa	2,186,635	905,124	58.61%
Tanzania	158,641	153,928	2.97%
Nigeria	484,352	153,453	68.32%
Senegal	230,780	225,046	2.48%
Mauritania	254,078	296,667	-16.76%
Ethiopia	465,552	142,663	69.36%
Total	**4,785,011**	**2,977,988**	**37.76%**
2014			
Ghana	0	0	0.00%
Burkina Faso	1,312,098	1,421,231	-8.32%
South Africa	2,285,048	1,493,678	34.63%
Tanzania	163,159	148,965	8.70%
Nigeria	854,679	4,762	99.44%
Senegal	277,115	272,266	1.75%

Mauritania	337,526	365,849	-8.39%
Ethiopia	281,647	144,980	48.52%
Total	**5,511,272**	**3,851,731**	**30.11%**
2013			
Ghana	1,742,040	1,172,026	32.72%
Burkina Faso	1,338,986	1,374,736	-2.67%
South Africa	1,548,895	2,126,557	-37.30%
Tanzania	391,289	404,707	-3.43%
Nigeria	858,391	84,992	90.10%
Senegal	298,560	263,071	11.89%
Mauritania	329,825	332,608	-0.84%
Ethiopia	188,537	155,418	17.57%
Total	**6,696,523**	**5,914,115**	**11.68%**
2012			
Ghana	1,603,681	1,212,353	24.40%
Burkina Faso	1,328,350	1,405,979	-5.84%
South Africa	1,899,219	1,664,407	12.36%
Tanzania	818,051	798,578	2.38%
Nigeria	549,169	72,966	86.71%
Senegal	339,714	334,154	1.64%
Mauritania	317,109	281,388	11.26%
Ethiopia	211,405	173,693	17.84%
Total	**7,066,698**	**5,943,518**	**15.89%**

Table 10: Sub-Saharan Africa Trade Discrepancy; Imports of Switzerland (International Trade Center, 2018)

Appendix J: Asia Pacific Trade Discrepancy; Exports of Switzerland

Leading partners Exports Switzerland to Asia Pacific	Imports from Switzerland M$^{Switzerland\text{-}Asia\ Pacific}$ *USD ('000)*	Exports to Asian Pacific partner E$^{Switzerland\text{-}Asia\ Pacific}$ *USD ('000)*	Percentage Difference DIF(E)^{Switzerland}
2012-2016			
China	200,762,350	96,945,917	51.71%
Hong Kong, China	129,219,512	135,830,373	-5.12%
India	110,478,937	113,839,626	-3.04%
Japan	37,781,258	36,153,832	4.31%
Singapore	20,491,334	42,941,589	-109.56%
Korea, Republic of	13,515,781	14,674,856	-8.58%
Australia	13,240,130	14,085,586	-6.39%
Thailand	27,438,117	24,441,132	10.92%
Taipei, Chinese	9,118,927	9,863,606	-8.17%
Malaysia	9,224,821	8,307,507	9.94%
Indonesia	2,890,323	3,148,326	-8.93%
Philippines	1,696,330	1,805,360	-6.43%
Pakistan	1,503,432	1,412,861	6.02%
Sri Lanka	934,016	991,277	-6.13%
New Zealand	1,215,913	1,212,141	0.31%
Kazakhstan	889,418	950,255	-6.84%
Total	**580,400,599**	**506,604,244**	**12.71%**
2016			
China	39,945,423.00	27,332,174.00	31.58%
Hong Kong, China	18,300,482.00	18,589,056.00	-1.58%
India	14,855,292.00	14,641,611.00	1.44%
Japan	7,651,743.00	7,700,782.00	-0.64%
Singapore	3,827,948.00	6,516,775.00	-70.24%
Korea, Republic of	2,964,508.00	2,357,939.00	20.46%
Australia	2,378,597.00	2,369,550.00	0.38%
Thailand	2,079,457.00	4,148,693.00	-99.51%
Taipei, Chinese	1,906,580.00	1,568,846.00	17.71%
Malaysia	1,517,233.00	1,718,787.00	-13.28%
Indonesia	466,334.00	723,730.00	-55.20%
Philippines	374,620.00	408,794.00	-9.12%
Pakistan	366,091.00	250,503.00	31.57%
Sri Lanka	215,766.00	274,209.00	-27.09%
New Zealand	210,723.00	254,571.00	-20.81%
Kazakhstan	150,651.00	110,020.00	26.97%
Total	**97,211,448**	**88,966,040**	**8.48%**
2015			
China	41,200,164	20,291,827	50.75%
Hong Kong, China	18,739,779	25,344,300	-35.24%

India	21,113,154	21,579,863	-2.21%
Japan	7,394,878	6,897,740	6.72%
Singapore	3,757,792	8,014,517	-113.28%
Korea, Republic of	2,465,484	3,006,990	-21.96%
Australia	2,425,473	2,529,098	-4.27%
Thailand	4,639,579	2,840,573	38.78%
Taipei, Chinese	1,670,157	1,991,299	-19.23%
Malaysia	2,117,227	1,754,444	17.13%
Indonesia	634,396	580,132	8.55%
Philippines	309,976	325,181	-4.91%
Pakistan	269,687	325,728	-20.78%
Sri Lanka	127,099	141,789	-11.56%
New Zealand	239,325	191,376	20.04%
Kazakhstan	129,441	172,387	-33.18%
Total	**107,233,611**	**95,987,244**	**10.49%**
2014			
China	40,541,055	18,407,102	54.60%
Hong Kong, China	23,908,601	24,188,149	-1.17%
India	21,133,033	21,118,378	0.07%
Japan	7,216,030	6,981,242	3.25%
Singapore	4,012,069	9,083,157	-126.40%
Korea, Republic of	2,770,922	3,242,348	-17.01%
Australia	2,545,010	2,777,558	-9.14%
Thailand	4,195,970	3,152,264	24.87%
Taipei, Chinese	1,786,820	2,046,440	-14.53%
Malaysia	2,262,644	1,908,465	15.65%
Indonesia	628,215	673,086	-7.14%
Philippines	339,487	363,659	-7.12%
Pakistan	319,694	298,972	6.48%
Sri Lanka	129,581	126,283	2.55%
New Zealand	263,804	237,364	10.02%
Kazakhstan	182,717	235,557	-28.92%
Total	**112,235,652**	**94,840,024**	**15.50%**
2013			
China	56,191,540	20,986,690	62.65%
Hong Kong, China	50,893,453	51,527,931	-1.25%
India	24,659,261	25,870,569	-4.91%
Japan	7,296,365	6,925,675	5.08%
Singapore	4,356,002	12,313,547	-182.68%
Korea, Republic of	2,724,053	3,112,749	-14.27%
Australia	2,900,690	3,137,396	-8.16%
Thailand	9,198,182	8,058,089	12.39%
Taipei, Chinese	1,870,718	2,093,288	-11.90%
Malaysia	1,888,047	1,687,746	10.61%

Indonesia	619,312	710,451	-14.72%
Philippines	389,844	355,494	8.81%
Pakistan	299,662	259,104	13.53%
Sri Lanka	227,560	241,043	-5.93%
New Zealand	243,964	257,176	-5.42%
Kazakhstan	210,379	192,408	8.54%
Total	**163,969,032**	**137,729,356**	**16.00%**
2012			
China	22,884,168	9,928,124	56.62%
Hong Kong, China	17,377,197	16,180,937	6.88%
India	28,718,197	30,629,205	-6.65%
Japan	8,222,242	7,648,393	6.98%
Singapore	4,537,523	7,013,593	-54.57%
Korea, Republic of	2,590,814	2,954,830	-14.05%
Australia	2,990,360	3,271,984	-9.42%
Thailand	7,324,929	6,241,513	14.79%
Taipei, Chinese	1,884,652	2,163,733	-14.81%
Malaysia	1,439,670	1,238,065	14.00%
Indonesia	542,066	460,927	14.97%
Philippines	282,403	352,232	-24.73%
Pakistan	248,298	278,554	-12.19%
Sri Lanka	234,010	207,953	11.13%
New Zealand	258,097	271,654	-5.25%
Kazakhstan	216,230	239,883	-10.94%
Total	**99,750,856**	**89,081,580**	**10.70%**

Table 11: Asia Pacific Trade Discrepancy; Exports of Switzerland (International Trade Center, 2018)

Appendix K: Asia Pacific Trade Discrepancy; Imports of Switzerland

Leading Partners Imports Switzerland from Asia Pacific	Imports from Asia Pacific $M^{Asia\text{-}Switzerland}$ *USD ('000)*	Exports to Switzerland $E^{Asia\text{-}Switzerland}$ *USD ('000)*	Percentage Difference $DIF(I)^{Switzerland}$
2012-2016			
China	62,226,235	16,539,988	73.42%
Hong Kong, China	19,201,698	25,666,561	-33.67%
Thailand	16,282,551	16,349,177	-0.41%
Japan	20,162,126	16,545,447	17.94%
Singapore	10,841,298	9,669,886	10.81%
Indonesia	4,720,363	3,545,891	24.88%
India	8,026,225	6,039,430	24.75%
Taipei, Chinese	5,163,837	2,295,397	55.55%
Malaysia	3,528,328	1,955,588	44.57%
Australia	3,638,528	3,373,102	7.29%
Korea, Republic of	3,804,892	3,661,532	3.77%
Philippines	2,318,065	1,616,692	30.26%
Cambodia	741,828	113,840	84.65%
Kazakhstan	4,805,251	19,165,051	-298.84%
Sri Lanka	875,792	565,767	35.40%
Pakistan	573,957	76,769	86.62%
Total	**166,910,974**	**127,180,118**	**23.80%**
2016			
China	12,576,564	3,198,273	74.57%
Hong Kong, China	8,219,924	9,332,797	-13.54%
Thailand	5,054,483	4,988,977	1.30%
Japan	3,585,771	3,127,560	12.78%
Singapore	3,417,880	3,109,508	9.02%
Indonesia	2,406,302	2,199,896	8.58%
India	1,509,600	1,034,155	31.49%
Taipei, Chinese	1,075,044	455,950	57.59%
Malaysia	969,658	676,091	30.28%
Australia	891,507	801,216	10.13%
Korea, Republic of	848,430	566,379	33.24%
Philippines	516,173	415,613	19.48%
Cambodia	356,497	21,665	93.92%
Kazakhstan	236,559	2,687,769	-1036.19%
Sri Lanka	160,532	103,541	35.50%
Pakistan	125,760	20,554	83.66%
Total	**41,950,684**	**32,739,944**	**21.96%**
2015			
China	12,957,659	3,195,314	75.34%
Hong Kong, China	2,721,833	4,248,364	-56.08%

Thailand	2,602,291	2,509,957	3.55%
Japan	3,518,777	2,700,167	23.26%
Singapore	2,022,395	1,716,366	15.13%
Indonesia	1,371,031	1,071,671	21.83%
India	1,530,097	928,443	39.32%
Taipei, Chinese	1,034,193	459,489	55.57%
Malaysia	671,519	396,884	40.90%
Australia	535,773	594,326	-10.93%
Korea, Republic of	673,997	1,492,092	-121.38%
Philippines	393,136	276,202	29.74%
Cambodia	116,023	23,134	80.06%
Kazakhstan	198,065	2,659,301	-1242.64%
Sri Lanka	172,798	103,231	40.26%
Pakistan	110,228	15,089	86.31%
Total	**30,629,815**	**22,390,030**	**26.90%**
2014			
China	13,284,667	3,109,868	76.59%
Hong Kong, China	3,094,225	4,456,969	-44.04%
Thailand	2,034,953	1,991,433	2.14%
Japan	3,985,152	3,029,105	23.99%
Singapore	1,709,737	1,784,660	-4.38%
Indonesia	340,959	133,905	60.73%
India	1,776,983	1,128,989	36.47%
Taipei, Chinese	1,026,839	458,879	55.31%
Malaysia	712,642	283,713	60.19%
Australia	597,420	494,400	17.24%
Korea, Republic of	690,082	319,927	53.64%
Philippines	426,175	247,847	41.84%
Cambodia	105,419	23,289	77.91%
Kazakhstan	1,034,628	4,539,249	-338.73%
Sri Lanka	213,300	142,276	33.30%
Pakistan	117,761	13,735	88.34%
Total	**31,150,942**	**22,158,244**	**28.87%**
2013			
China	12,334,746	3,529,126	71.39%
Hong Kong, China	2,167,207	3,584,138	-65.38%
Thailand	1,681,133	1,612,459	4.08%
Japan	4,026,516	3,312,448	17.73%
Singapore	1,448,914	1,478,758	-2.06%
Indonesia	318,932	81,925	74.31%
India	1,662,213	1,777,805	-6.95%
Taipei, Chinese	1,011,028	482,581	52.27%
Malaysia	581,505	263,057	54.76%
Australia	786,545	797,262	-1.36%

Korea, Republic of	709,239	876,681	-23.61%
Philippines	472,406	285,575	39.55%
Cambodia	87,719	24,504	72.07%
Kazakhstan	1,876,984	4,313,571	-129.81%
Sri Lanka	170,920	122,749	28.18%
Pakistan	105,302	12,890	87.76%
Total	**29,441,309**	**22,555,529**	**23.39%**
2012			
China	11,072,599	3,507,407	68.32%
Hong Kong, China	2,998,509	4,044,293	-34.88%
Thailand	4,909,691	5,246,351	-6.86%
Japan	5,045,910	4,376,167	13.27%
Singapore	2,242,372	1,580,594	29.51%
Indonesia	283,139	58,494	79.34%
India	1,547,332	1,170,038	24.38%
Taipei, Chinese	1,016,733	438,498	56.87%
Malaysia	593,004	335,843	43.37%
Australia	827,283	685,898	17.09%
Korea, Republic of	883,144	406,453	53.98%
Philippines	510,175	391,455	23.27%
Cambodia	76,170	21,248	72.10%
Kazakhstan	1,459,015	4,965,161	-240.31%
Sri Lanka	158,242	93,970	40.62%
Pakistan	114,906	14,501	87.38%
Total	**33,738,224**	**27,336,371**	**18.98%**

Table 12: Asia Pacific Trade Discrepancy; Imports of Switzerland (International Trade Center, 2018)

Appendix L: Latin America Trade Discrepancy; Exports of Switzerland

Leading Partners Exports Switzerland to Latin America	Imports from Switzerland M$^{Switzerland-L. America}$ *USD ('000)*	Exports to Latin American partner E$^{Switzerland-L. America}$ *USD ('000)*	Percentage Difference DIF(E)^{Switzerland}
2012-2016			
Brazil	12,845,411	11,239,284	12.50%
Mexico	8,343,827	8,175,346	2.02%
Argentina	3,256,661	3,171,737	2.61%
Colombia	2,420,266	2,256,508	6.77%
Chile	1,470,316	1,427,823	2.89%
Uruguay	648,502	874,657	-34.87%
Costa Rica	623,186	540,659	13.24%
Peru	878,691	811,083	7.69%
Ecuador	678,609	601,279	11.40%
Total	**31,165,469**	**29,098,376**	**6.63%**
2016			
Brazil	1,952,218	1,902,751	2.53%
Mexico	1,374,154	1,657,910	-20.65%
Argentina	678,754	517,080	23.82%
Colombia	479,119	386,974	19.23%
Chile	293,824	260,156	11.46%
Uruguay	242,829	31,901	86.86%
Costa Rica	174,843	145,170	16.97%
Peru	167,385	156,012	6.79%
Ecuador	142,253	113,089	20.50%
Total	**5,505,379**	**5,171,043**	**6.07%**
2015			
Brazil	2,366,778	2,144,251	9.40%
Mexico	1,688,751	1,513,350	10.39%
Argentina	688,711	880,418	-27.84%
Colombia	433,236	452,989	-4.56%
Chile	261,546	267,966	-2.45%
Uruguay	35,766	255,254	-613.68%
Costa Rica	114,904	88,132	23.30%
Peru	157,541	157,699	-0.10%
Ecuador	117,381	108,343	7.70%
Total	**5,864,614**	**5,868,402**	**-0.06%**
2014			
Brazil	2,789,119	2,280,781	18.23%
Mexico	2,009,358	1,901,248	5.38%
Argentina	530,372	730,467	-37.73%
Colombia	519,229	472,160	9.07%

Chile	284,635	278,332	2.21%
Uruguay	36,345	288,513	-693.82%
Costa Rica	116,753	79,840	31.62%
Peru	202,304	164,862	18.51%
Ecuador	138,584	123,403	10.95%
Total	**6,626,699**	**6,319,606**	**4.63%**
2013			
Brazil	2,953,957	2,402,136	18.68%
Mexico	1,736,059	1,644,952	5.25%
Argentina	805,856	511,542	36.52%
Colombia	481,360	508,790	-5.70%
Chile	313,444	333,781	-6.49%
Uruguay	299,110	49,483	83.46%
Costa Rica	84,344	153,622	-82.14%
Peru	196,044	159,589	18.60%
Ecuador	128,501	137,420	-6.94%
Total	**6,998,675**	**5,901,315**	**15.68%**
2012			
Brazil	2,783,339	2,509,365	9.84%
Mexico	1,535,505	1,457,886	5.05%
Argentina	552,968	532,230	3.75%
Colombia	507,322	435,595	14.14%
Chile	316,867	287,588	9.24%
Uruguay	34,452	249,506	-624.21%
Costa Rica	132,342	73,895	44.16%
Peru	155,417	172,921	-11.26%
Ecuador	151,890	119,024	21.64%
Total	**6,170,102**	**5,838,010**	**5.38%**

Table 13: Latin America Trade Discrepancy; Exports of Switzerland (International Trade Center, 2018)

Appendix M: Latin America Trade Discrepancy; Imports of Switzerland

Leading partners Imports Switzerland from Latin America	Imports from Latin American Partner $M^{\text{L. America-Switzerland}}$ *USD ('000)*	Exports to Switzerland $E^{\text{L. America-Switzerland}}$ *USD ('000)*	Percentage Difference $DIF(I)^{\text{Switzerland}}$
2012-2016			
Peru	16,928,284	15,987,508	5.56%
Brazil	8,624,089	9,988,780	-15.82%
Argentina	4,272,200	4,161,774	2.58%
Mexico	8,151,344	5,900,189	27.62%
Chile	4,248,960	4,040,486	4.91%
Colombia	3,337,943	2,479,754	25.71%
Costa Rica	545,565	22,925	95.80%
Total	**46,108,385**	**42,581,416**	**7.65%**
2016			
Peru	2,465,338	2,551,461	-3.49%
Brazil	1,245,664	1,656,929	-33.02%
Argentina	1,155,548	1,141,073	1.25%
Mexico	989,397	715,845	27.65%
Chile	528,602	558,528	-5.66%
Colombia	524,613	376,192	28.29%
Costa Rica	104,224	5,480	94.74%
Total	**7,013,386**	**7,005,508**	**0.11%**
2015			
Peru	2,750,760	2,694,463	2.05%
Brazil	1,495,224	1,944,965	-30.08%
Argentina	1,265,715	1,257,915	0.62%
Mexico	1,770,060	1,762,935	0.40%
Chile	584,373	515,566	11.77%
Colombia	602,425	419,852	30.31%
Costa Rica	108,906	6,433	94.09%
Total	**8,577,463**	**8,602,129**	**-0.29%**
2014			
Peru	2,883,378	2,642,270	8.36%
Brazil	1,747,692	2,316,662	-32.56%
Argentina	586,214	544,849	7.06%
Mexico	1,945,585	1,485,895	23.63%
Chile	859,681	848,329	1.32%
Colombia	720,374	501,544	30.38%
Costa Rica	114,333	4,650	95.93%
Total	**8,857,257**	**8,344,199**	**5.79%**
2013			
Peru	3,385,709	3,024,877	10.66%
Brazil	2,018,969	2,362,248	-17.00%

Argentina	586,404	561,180	4.30%
Mexico	1,976,206	1,111,804	43.74%
Chile	1,101,269	1,040,961	5.48%
Colombia	595,485	460,806	22.62%
Costa Rica	112,189	1,565	98.61%
Total	**9,776,231**	**8,563,441**	**12.41%**
2012			
Peru	5,443,099	5,074,437	6.77%
Brazil	2,116,540	1,707,976	19.30%
Argentina	678,319	656,757	3.18%
Mexico	1,470,096	823,710	43.97%
Chile	1,175,035	1,077,102	8.33%
Colombia	895,046	721,360	19.41%
Costa Rica	105,913	4,797	95.47%
Total	**11,884,048**	**10,066,139**	**15.30%**

Table 14: Latin America Trade Discrepancy; Imports of Switzerland (International Trade Center, 2018)

Appendix N: North America Trade Discrepancy; Exports of Switzerland

Leading Partners Exports Switzerland to North America	Imports from Switzerland $M^{Switzerland-N.\ America}$ *USD ('000)*	Exports to North American Partner $E^{Switzerland-N.\ America}$ *USD ('000)*	Percentage Difference $DIF(E)^{Switzerland}$
2012-2016			
USA	155,585,727	152,041,967	2.28%
Canada	18,055,539	18,176,109	-0.67%
Total	**173,641,266**	**170,218,076**	**1.97%**
2016			
USA	36,873,784	36,995,891	-0.33%
Canada	3,531,700	3,399,149	3.75%
Total	**40,405,484**	**40,395,040**	**0.03%**
2015			
USA	31,970,225	30,805,334	3.64%
Canada	3,543,494	3,658,293	-3.24%
Total	**35,513,719**	**34,463,627**	**2.96%**
2014			
USA	31,759,082	31,483,800	0.87%
Canada	3,522,754	3,687,875	-4.69%
Total	**35,281,836**	**35,171,675**	**0.31%**
2013			
USA	28,771,385	27,261,713	5.25%
Canada	3,852,940	3,750,940	2.65%
Total	**32,624,325**	**31,012,653**	**4.94%**
2012			
USA	26,211,251	25,495,229	2.73%
Canada	3,604,651	3,679,852	-2.09%
Total	**29,815,902**	**29,175,081**	**2.15%**

Table 15: North America Trade Discrepancy; Exports of Switzerland (International Trade Center, 2018)

Appendix O: North America Trade Discrepancy; Imports of Switzerland

Leading Partners Imports Switzerland from North America	Imports from North American Partner $M^{\text{N. America-Switzerland}}$ *USD ('000)*	Exports to Switzerland $E^{\text{N. America-Switzerland}}$ *USD ('000)*	Percentage Difference $DIF(I)^{\text{Switzerland}}$
2012-2016			
USA	115,472,335	119,731,049	-3.69%
Canada	7,733,990	5,817,134	24.78%
Total	**123,206,325**	**125,548,183**	**-1.90%**
2016			
USA	24,037,962	22,621,675	5.89%
Canada	1,044,149	980,342	6.11%
Total	**25,082,111**	**23,602,017**	**5.90%**
2015			
USA	20,313,439	22,119,238	-8.89%
Canada	1,034,427	927,050	10.38%
Total	**21,347,866**	**23,046,288**	**-7.96%**
2014			
USA	21,316,825	22,133,687	-3.83%
Canada	1,562,152	1,355,750	13.21%
Total	**22,878,977**	**23,489,437**	**-2.67%**
2013			
USA	24,363,913	26,493,113	-8.74%
Canada	2,789,031	1,704,637	38.88%
Total	**27,152,944**	**28,197,750**	**-3.85%**
2012			
USA	25,440,196	26,363,336	-3.63%
Canada	1,304,231	849,355	34.88%
Total	**26,744,427**	**27,212,691**	**-1.75%**

Table 16: North America Trade Discrepancy; Imports of Switzerland (International Trade Center, 2018)

Appendix P: Discrepancy by Industry; Exports to Singapore

2016					
Merchandise	Im. SG (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	0.278	2.978	-2.7	-971.22%	100.56%
88 Photographic appart.; Clocks	1.315	1.05	0.265	20.15%	-9.87%
51 Organic chemicals	0.69	0.797	-0.107	-15.51%	3.99%
89 Misc. manufactured articles	0.226	0.41	-0.184	-81.42%	6.85%
54 Med. And pharm. Products	0.235	0.219	0.016	6.81%	-0.60%
74 General industl. Machinery	0.138	0.12	0.018	13.04%	-0.67%
87 Scientific equipment	0.163	0.106	0.057	34.97%	-2.12%
77 Elec. Machinery	0.101	0.072	0.029	28.71%	-1.08%
93 Special trans., not classified	0.025	0.105	-0.08	-320.00%	2.98%
Residual	0.661	0.66	0.001	0.15%	-0.04%
Total	3.832*	6.517	-2.685	-70.07%	100.00%

*according to UN Comtrade $3.832bn, whereas according to Competitiveness Map only $3.827bn; difference of $0.005bn

2015					
Merchandise	Im. SG (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	0.282	4.303	-4.021	-1425.89%	94.46%
88 Photographic appart.; Clocks	1.585	1.201	0.384	24.23%	-9.02%
51 Organic chemicals	0.399	0.571	-0.172	-43.11%	4.04%
89 Misc. manufactured articles	0.274	0.657	-0.383	-139.78%	9.00%
54 Med. And pharm. Products	0.176	0.212	-0.036	-20.45%	0.85%
74 General industl. Machinery	0.173	0.117	0.056	32.37%	-1.32%
87 Scientific equipment	0.147	0.102	0.045	30.61%	-1.06%
77 Elec. Machinery	0.104	0.075	0.029	27.88%	-0.68%
93 Special trans., not classified	0.029	0.104	-0.075	-258.62%	1.76%
Residual	0.589	0.673	-0.084	-14.26%	1.97%
Total	3.758	8.015	-4.257	-113.28%	100.00%

2014					
Merchandise	Im. SG (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	0.332	5.522	-5.19	-1563.25%	102.35%
88 Photographic appart.; Clocks	1.494	1.242	0.252	16.87%	-4.97%
51 Organic chemicals	0.472	0.625	-0.153	-32.42%	3.02%
89 Misc. manufactured articles	0.409	0.33	0.079	19.32%	-1.56%
54 Med. And pharm. Products	0.186	0.247	-0.061	-32.80%	1.20%
74 General industl. Machinery	0.149	0.107	0.042	28.19%	-0.83%
87 Scientific equipment	0.161	0.113	0.048	29.81%	-0.95%
77 Elec. Machinery	0.12	0.118	0.002	1.67%	-0.04%
93 Special trans., not classified	0.029	0.116	-0.087	-300.00%	1.72%
Residual	0.66	0.663	-0.003	-0.45%	0.06%
Total	4.012	9.083	-5.071	-126.40%	100.00%

2013					
Merchandise	Im. SG (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	0.396	8.285	-7.889	-1992.17%	99.13%
88 Photographic appart.; Clocks	1.438	1.244	0.194	13.49%	-2.44%
51 Organic chemicals	0.765	0.966	-0.201	-26.27%	2.53%
89 Misc. manufactured articles	0.384	0.403	-0.019	-4.95%	0.24%
54 Med. And pharm. Products	0.207	0.217	-0.01	-4.83%	0.13%
74 General industl. Machinery	0.114	0.099	0.015	13.16%	-0.19%
87 Scientific equipment	0.163	0.115	0.048	29.45%	-0.60%
77 Elec. Machinery	0.123	0.11	0.013	10.57%	-0.16%
93 Special trans., not classified	0.026	0.104	-0.078	-300.00%	0.98%
Residual	0.74	0.771	-0.031	-4.19%	0.39%
Total	4.356	12.314	-7.958	-182.69%	100.00%

2012					
Merchandise	Im. SG (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	0.459	3.177	-2.718	-592.16%	109.77%
88 Photographic appart.; Clocks	1.433	1.221	0.212	14.79%	-8.56%
51 Organic chemicals	0.963	1.047	-0.084	-8.72%	3.39%
89 Misc. manufactured articles	0.305	0.272	0.033	10.82%	-1.33%
54 Med. And pharm. Products	0.176	0.174	0.002	1.14%	-0.08%
74 General industl. Machinery	0.11	0.106	0.004	3.64%	-0.16%
87 Scientific equipment	0.142	0.11	0.032	22.54%	-1.29%
77 Elec. Machinery	0.15	0.121	0.029	19.33%	-1.17%
93 Special trans., not classified	0.037	0.116	-0.079	-213.51%	3.19%
Residual	0.763	0.67	0.093	12.19%	-3.76%
Total	4.538	7.014	-2.476	-54.56%	100.00%

2012-2016					
Merchandise	Im. SG (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	1.747	24.265	-22.518	-1288.95%	100.32%
88 Photographic appart.; Clocks	7.265	5.958	1.307	17.99%	-5.82%
51 Organic chemicals	3.289	4.006	-0.717	-21.80%	3.19%
89 Misc. manufactured articles	1.598	2.072	-0.474	-29.66%	2.11%
54 Med. And pharm. Products	0.98	1.069	-0.089	-9.08%	0.40%
74 General industl. Machinery	0.684	0.549	0.135	19.74%	-0.60%
87 Scientific equipment	0.776	0.546	0.23	29.64%	-1.02%
77 Elec. Machinery	0.598	0.496	0.102	17.06%	-0.45%
93 Special trans., not classified	0.146	0.545	-0.399	-273.29%	1.78%
Residual	3.413	3.437	-0.024	-0.70%	0.11%
Total	20.496*	42.943	-22.447	-109.52%	100.00%

*according to UN Comtrade $20.496bn, whereas according to Competitiveness Map only $20.491bn; difference of $0.005bn

Table 17: Discrepancy by Industry; Exports to Singapore (United Nations, 2016l)

Appendix Q: Discrepancy by Industry; Exports to Israel

2016					
Merchandise	Im. IL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.804	0.04	0.764	95.02%	24.27%
54 Med. And pharm. Products	0.424	0.369	0.055	12.97%	1.75%
66 Non-metal. Mineral manufact.	0.661	0.197	0.464	70.20%	14.74%
04 Cereals, cereal preparations	0.347	0.02	0.327	94.24%	10.39%
67 Iron and steel	0.302	0.02	0.282	93.38%	8.96%
55 Essential oils; toilet products	0.179	0.02	0.159	88.83%	5.05%
72 Special industry machinery	0.129	0.024	0.105	81.40%	3.34%
88 Photographic appart.; Clocks	0.088	0.095	-0.007	-7.95%	-0.22%
89 Misc. manufactured articles	0.083	0.084	-0.001	-1.20%	-0.03%
71 Power-generating machinery	0.039	0.034	0.005	12.82%	0.16%
74 General industl. Machinery	0.05	0.033	0.017	34.00%	0.54%
07 Coffee, tea, cocoa, spices	0.091	0.043	0.048	52.75%	1.52%
87 Scientific equipment	0.105	0.043	0.062	59.05%	1.97%
Residual	0.986	0.118	0.868	88.03%	27.57%
Total	4.288	1.14	3.148	73.41%	100.00%

2015					
Merchandise	Im. IL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.712	0.005	0.707	99.30%	21.64%
54 Med. And pharm. Products	0.472	0.412	0.06	12.71%	1.84%
66 Non-metal. Mineral manufact.	0.898	0.221	0.677	75.39%	20.72%
04 Cereals, cereal preparations	0.323	0.002	0.321	99.38%	9.83%
67 Iron and steel	0.349	0.001	0.348	99.71%	10.65%
55 Essential oils; toilet products	0.139	0.018	0.121	87.05%	3.70%
72 Special industry machinery	0.109	0.035	0.074	67.89%	2.27%
88 Photographic appart.; Clocks	0.082	0.089	-0.007	-8.54%	-0.21%
89 Misc. manufactured articles	0.082	0.056	0.026	31.71%	0.80%
71 Power-generating machinery	0.039	0.031	0.008	20.51%	0.24%
74 General industl. Machinery	0.051	0.032	0.019	37.25%	0.58%
07 Coffee, tea, cocoa, spices	0	0.034	-0.034	--	-1.04%
87 Scientific equipment	0.073	0.032	0.041	56.16%	1.25%
Residual	1.097	0.191	0.906	82.59%	27.73%
Total	4.426	1.159	3.267	73.81%	100.00%

2014				
Merchandise	Im. IL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.939	0.008	0.931	99.15%	23.19%
54 Med. And pharm. Products	0.465	0.407	0.058	12.47%	1.44%
66 Non-metal. Mineral manufact.	1.255	0.201	1.054	83.98%	26.25%
04 Cereals, cereal preparations	0.526	0.001	0.525	99.81%	13.08%
67 Iron and steel	0.257	0.018	0.239	93.00%	5.95%
55 Essential oils; toilet products	0.171	0.018	0.153	89.47%	3.81%
72 Special industry machinery	0.099	0.037	0.062	62.63%	1.54%
88 Photographic appart.; Clocks	0.083	0.094	-0.011	-13.25%	-0.27%
89 Misc. manufactured articles	0.067	0.074	-0.007	-10.45%	-0.17%
71 Power-generating machinery	0.124	0.014	0.11	88.71%	2.74%
74 General industl. Machinery	0.056	0.033	0.023	41.07%	0.57%
07 Coffee, tea, cocoa, spices	0.086	0.038	0.048	55.81%	1.20%
87 Scientific equipment	0.043	0.027	0.016	37.21%	0.40%
Residual	1.027	0.213	0.814	79.26%	20.27%
Total	5.198	1.183	4.015	77.24%	100.00%

2013				
Merchandise	Im. IL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.012	0.008	0.004	33.33%	0.13%
54 Med. And pharm. Products	0.452	0.4	0.052	11.50%	1.66%
66 Non-metal. Mineral manufact.	1.1365	0.184	0.9525	83.81%	30.46%
04 Cereals, cereal preparations	0.465	0.002	0.463	99.57%	14.81%
67 Iron and steel	0.313	0.014	0.299	95.53%	9.56%
55 Essential oils; toilet products	0.186	0.022	0.164	88.17%	5.24%
72 Special industry machinery	0.066	0.035	0.031	46.97%	0.99%
88 Photographic appart.; Clocks	0.087	0.103	-0.016	-18.39%	-0.51%
89 Misc. manufactured articles	0	0.042	-0.042	--	-1.34%
71 Power-generating machinery	0.134	0.038	0.096	71.64%	3.07%
74 General industl. Machinery	0	0.034	-0.034	--	-1.09%
07 Coffee, tea, cocoa, spices	0.094	0.037	0.057	60.64%	1.82%
87 Scientific equipment	0.04	0.029	0.011	27.50%	0.35%
Residual	1.3635	0.274	1.0895	79.90%	34.84%
Total	4.349*	1.222	3.127	71.90%	100.00%

*according to UN Comtrade only $4.349bn, whereas according to Competitiveness Map $4.397bn; difference of $-0.048bn

2012					
Merchandise	Im. IL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.08	0.01	0.07	87.50%	2.35%
54 Med. And pharm. Products	0.381	0.338	0.043	11.29%	1.44%
66 Non-metal. Mineral manufact.	1.283	0.16	1.123	87.53%	37.67%
04 Cereals, cereal preparations	0.437	0.002	0.435	99.54%	14.59%
67 Iron and steel	0.222	0.001	0.221	99.55%	7.41%
55 Essential oils; toilet products	0.162	0.024	0.138	85.19%	4.63%
72 Special industry machinery	0.067	0.036	0.031	46.27%	1.04%
88 Photographic appart.; Clocks	0.069	0.086	-0.017	-24.64%	-0.57%
89 Misc. manufactured articles	0.043	0	0.043	100.00%	1.44%
71 Power-generating machinery	0.017	0	0.017	100.00%	0.57%
74 General industl. Machinery	0.071	0.045	0.026	36.62%	0.87%
07 Coffee, tea, cocoa, spices	0.072	0.03	0.042	58.33%	1.41%
87 Scientific equipment	0.034	0.028	0.006	17.65%	0.20%
Residual	1.117	0.314	0.803	71.89%	26.94%
Total	4.055	1.074	2.981	73.51%	100.00%

2012-2016					
Merchandise	Im. IL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	2.547	0.071	2.476	97.21%	14.97%
54 Med. And pharm. Products	2.194	1.926	0.268	12.22%	1.62%
66 Non-metal. Mineral manufact.	5.2335	0.963	4.2705	81.60%	25.82%
04 Cereals, cereal preparations	2.098	0.027	2.071	98.71%	12.52%
67 Iron and steel	1.443	0.054	1.389	96.26%	8.40%
55 Essential oils; toilet products	0.837	0.102	0.735	87.81%	4.44%
72 Special industry machinery	0.47	0.167	0.303	64.47%	1.83%
88 Photographic appart.; Clocks	0.409	0.467	-0.058	-14.18%	-0.35%
89 Misc. manufactured articles	0.275	0.256	0.019	6.91%	0.11%
71 Power-generating machinery	0.353	0.117	0.236	66.86%	1.43%
74 General industl. Machinery	0.228	0.177	0.051	22.37%	0.31%
07 Coffee, tea, cocoa, spices	0.343	0.182	0.161	46.94%	0.97%
87 Scientific equipment	0.295	0.159	0.136	46.10%	0.82%
Residual	5.5905	1.11	4.4805	80.14%	27.09%
Total	22.316	5.778	16.538	74.11%	100.00%

*according to UN Comtrade only $22.316bn, whereas according to Competitiveness Map $22.356bn; difference of $-0.040bn

Table 18: Discrepancy by Industry; Exports to Israel (United Nations, 2016l)

Appendix R: Discrepancy by Industry; Exports to the Netherlands

2016					
Merchandise	Im. NL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	1.088	1.273	-0.185	-17.00%	7.85%
89 Misc. manufactured articles	0.176	0.857	-0.681	-386.93%	28.90%
87 Scientific equipment	0.114	0.35	-0.236	-207.02%	10.02%
74 General industl. Machinery	0.172	0.268	-0.096	-55.81%	4.07%
77 Elec. Machinery	0.163	0.261	-0.098	-60.12%	4.16%
88 Photographic appart.; Clocks	0.187	0.256	-0.069	-36.90%	2.93%
93 Special trans., not classified	0	0.172	-0.172	--	7.30%
72 Special industry machinery	0.15	0.147	0.003	2.00%	-0.13%
07 Coffee, tea, cocoa, spices	0.025	0.131	-0.106	-424.00%	4.50%
Residual	0.694	1.41	-0.716	-103.17%	30.39%
Total	2.769*	5.125	-2.356	-85.08%	100.00%

*according to UN Comtrade only $2.769bn, whereas according to Competitiveness Map $3.435bn; difference of $-0.666bn

2015					
Merchandise	Im. NL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	0.828	1.118	-0.29	-35.02%	12.36%
89 Misc. manufactured articles	0.193	1.004	-0.811	-420.21%	34.55%
87 Scientific equipment	0.107	0.334	-0.227	-212.15%	9.67%
74 General industl. Machinery	0.181	0.248	-0.067	-37.02%	2.85%
77 Elec. Machinery	0.167	0.256	-0.089	-53.29%	3.79%
88 Photographic appart.; Clocks	0.18	0.272	-0.092	-51.11%	3.92%
93 Special trans., not classified	0.16	0.183	-0.023	-14.38%	0.98%
72 Special industry machinery	0.107	0.129	-0.022	-20.56%	0.94%
07 Coffee, tea, cocoa, spices	0.032	0.147	-0.115	-359.38%	4.90%
Residual	0.739	1.35	-0.611	-82.68%	26.03%
Total	2.694*	5.041	-2.347	-87.12%	100.00%

*according to UN Comtrade only $2.694bn, whereas according to Competitiveness Map $2.910bn; difference of $-0.216bn

2014					
Merchandise	Im. NL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	0.94	1.404	-0.464	-49.36%	15.55%
89 Misc. manufactured articles	0.14	1.182	-1.042	-744.29%	34.92%
87 Scientific equipment	0.153	0.307	-0.154	-100.65%	5.16%
74 General industl. Machinery	0.188	0.261	-0.073	-38.83%	2.45%
77 Elec. Machinery	0.161	0.277	-0.116	-72.05%	3.89%
88 Photographic appart.; Clocks	0.18	0.269	-0.089	-49.44%	2.98%
93 Special trans., not classified	0	0.088	-0.088	--	2.95%
72 Special industry machinery	0.095	0.109	-0.014	-14.74%	0.47%
07 Coffee, tea, cocoa, spices	0.025	0.173	-0.148	-592.00%	4.96%
Residual	0.855	1.651	-0.796	-93.10%	26.68%
Total	2.737*	5.721	-2.984	-109.02%	100.00%

*according to UN Comtrade only $2.737bn, whereas according to Competitiveness Map $2.985bn; difference of $-0.248bn

2013					
Merchandise	Im. NL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Medicinal, pharma products	0.988	1.303	-0.315	-31.88%	10.68%
89 Misc Manufact. Goods	0.169	1.183	-1.014	-600.00%	34.38%
87 Scientific equipment	0.144	0.321	-0.177	-122.92%	6.00%
74 Gen Industry. Mach. Nes	0.193	0.304	-0.111	-57.51%	3.76%
77 Elec. Machinery	0.168	0.27	-0.102	-60.71%	3.46%
88 Photo, Apparat.Mes, Clocks	0.156	0.253	-0.097	-62.18%	3.29%
93 Special trans., not classified	0	0	0	--	0.00%
72 Special industry machinery	0.107	0.12	-0.013	-12.15%	0.44%
07 Coffee, tea, cocoa, spices	0.038	0.168	-0.13	-342.11%	4.41%
Residual	0.873	1.863	-0.99	-113.40%	33.57%
Total	2.836*	5.785	-2.949	-103.98%	100.00%

*according to UN Comtrade only $2.836bn, whereas according to Competitiveness Map $3.142bn; difference of $-0.306bn

2012					
Merchandise	Im. NL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	0.959	1.271	-0.312	-32.53%	12.99%
89 Misc. manufactured articles	0.089	1.171	-1.082	-1215.73%	45.06%
87 Scientific equipment	0.139	0.247	-0.108	-77.70%	4.50%
74 General industl. Machinery	0.174	0.227	-0.053	-30.46%	2.21%
77 Elec. Machinery	0.204	0.3	-0.096	-47.06%	4.00%
88 Photographic appart.; Clocks	0.151	0.203	-0.052	-34.44%	2.17%
93 Special trans., not classified	0.183	0.097	0.086	46.99%	-3.58%
72 Special industry machinery	0.1	0.127	-0.027	-27.00%	1.12%
07 Coffee, tea, cocoa, spices	0.149	0.164	-0.015	-10.07%	0.62%
Residual	0.972	1.714	-0.742	-76.34%	30.90%
Total	3.120*	5.521	-2.401	-76.96%	100.00%

*according to UN Comtrade only $3.120bn, whereas according to Competitiveness Map $3.238bn; difference of $-0.118bn

2012-2016					
Merchandise	Im. NL (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	4.803	6.369	-1.566	-32.60%	12.01%
89 Misc. manufactured articles	0.767	5.397	-4.63	-603.65%	35.51%
87 Scientific equipment	0.657	1.559	-0.902	-137.29%	6.92%
74 General industl. Machinery	0.908	1.308	-0.4	-44.05%	3.07%
77 Elec. Machinery	0.863	1.364	-0.501	-58.05%	3.84%
88 Photographic appart.; Clocks	0.854	1.253	-0.399	-46.72%	3.06%
93 Special trans., not classified	0.343	0.54	-0.197	-57.43%	1.51%
72 Special industry machinery	0.559	0.632	-0.073	-13.06%	0.56%
07 Coffee, tea, cocoa, spices	0.269	0.783	-0.514	-191.08%	3.94%
Residual	4.133	7.988	-3.855	-93.27%	29.57%
Total	14.156*	27.193	-13.037	-92.10%	100.00%

*according to UN Comtrade only $14.156bn, whereas according to Competitiveness Map $15.710bn; difference of $-1.554bn

Table 19: Discrepancy by Industry; Exports to the Netherlands (United Nations, 2016l)

Appendix S: Discrepancy by Industry; Exports to Spain

2016					
Merchandise	Im. ES (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	1.375	1.929	-0.554	-40.29%	30.86%
51 Organic chemicals	0.876	1.438	-0.562	-64.16%	31.31%
88 Photographic appart.; Clocks	0.425	0.459	-0.034	-8.00%	1.89%
89 Misc. manufactured articles	0.183	0.228	-0.045	-24.59%	2.51%
74 General industl. Machinery	0.173	0.183	-0.01	-5.78%	0.56%
07 Coffee, tea, cocoa, spices	0.033	0.173	-0.14	-424.24%	7.80%
Residual	0.84	1.29	-0.45	-53.57%	25.07%
Total	3.905	5.7	-1.795	-45.97%	100.00%

2015					
Merchandise	Im. ES (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	1.061	1.846	-0.785	-73.99%	35.30%
51 Organic chemicals	0.626	1.38	-0.754	-120.45%	33.90%
88 Photographic appart.; Clocks	0.478	0.52	-0.042	-8.79%	1.89%
89 Misc. manufactured articles	0.184	0.22	-0.036	-19.57%	1.62%
74 General industl. Machinery	0.15	0.194	-0.044	-29.33%	1.98%
07 Coffee, tea, cocoa, spices	0.033	0.183	-0.15	-454.55%	6.74%
Residual	0.881	1.294	-0.413	-46.88%	18.57%
Total	3.413	5.637	-2.224	-65.16%	100.00%

2014					
Merchandise	Im. ES (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	1.249	2.151	-0.902	-72.22%	34.85%
51 Organic chemicals	0.715	1.671	-0.956	-133.71%	36.94%
88 Photographic appart.; Clocks	0.477	0.516	-0.039	-8.18%	1.51%
89 Misc. manufactured articles	0.198	0.235	-0.037	-18.69%	1.43%
74 General industl. Machinery	0.172	0.221	-0.049	-28.49%	1.89%
07 Coffee, tea, cocoa, spices	0.036	0.202	-0.166	-461.11%	6.41%
Residual	0.955	1.394	-0.439	-45.97%	16.96%
Total	3.802	6.39	-2.588	-68.07%	100.00%

2013					
Merchandise	Im. ES (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	0.974	1.893	-0.919	-94.35%	39.77%
51 Organic chemicals	0.501	1.42	-0.919	-183.43%	39.77%
88 Photographic appart.; Clocks	0.428	0.473	-0.045	-10.51%	1.95%
89 Misc. manufactured articles	0.221	0.254	-0.033	-14.93%	1.43%
74 General industl. Machinery	0.17	0.144	0.026	15.29%	-1.13%
07 Coffee, tea, cocoa, spices	0.252	0.271	-0.019	-7.54%	0.82%
Residual	0.908	1.31	-0.402	-44.27%	17.40%
Total	3.454	5.765	-2.311	-66.91%	100.00%

2012					
Merchandise	Im. ES (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	0.745	1.831	-1.086	-145.77%	43.08%
51 Organic chemicals	0.65	1.428	-0.778	-119.69%	30.86%
88 Photographic appart.; Clocks	0.402	0.458	-0.056	-13.93%	2.22%
89 Misc. manufactured articles	0.215	0.377	-0.162	-75.35%	6.43%
74 General industl. Machinery	0.133	0.141	-0.008	-6.02%	0.32%
07 Coffee, tea, cocoa, spices	0.243	0.255	-0.012	-4.94%	0.48%
Residual	0.986	1.405	-0.419	-42.49%	16.62%
Total	3.374	5.895	-2.521	-74.72%	100.00%

2012-2016					
Merchandise	Im. ES (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
54 Med. And pharm. Products	5.404	9.65	-4.246	-78.57%	37.12%
51 Organic chemicals	3.368	7.337	-3.969	-117.84%	34.70%
88 Photographic appart.; Clocks	2.21	2.426	-0.216	-9.77%	1.89%
89 Misc. manufactured articles	1.001	1.314	-0.313	-31.27%	2.74%
74 General industl. Machinery	0.798	0.883	-0.085	-10.65%	0.74%
07 Coffee, tea, cocoa, spices	0.597	1.084	-0.487	-81.57%	4.26%
Residual	4.57	6.693	-2.123	-46.46%	18.56%
Total	17.948	29.387	-11.439	-63.73%	100.00%

Table 20: Discrepancy by Industry; Exports to Spain (United Nations, 2016l)

Appendix T: Discrepancy by Industry; Exports to China

2016					
Merchandise	Im. CN (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
93 Special trans., not classified	0	0	0	--	0.00%
97 Gold, non-monetary (exl. ores)	31.07	17.251	13.819	44.48%	109.56%
54 Med. And pharm. Products	1.429	3.56	-2.131	-149.13%	-16.90%
88 Photographic appart.; Clocks	1.661	1.343	0.318	19.15%	2.52%
74 General industl. Machinery	0.751	0.605	0.146	19.44%	1.16%
73 Metalworking machinery	0.57	0.548	0.022	3.86%	0.17%
77 Elec. Machinery	0.758	0.542	0.216	28.50%	1.71%
87 Scientific equipment	0.887	0.527	0.36	40.59%	2.85%
72 Special industry machinery	0.543	0.401	0.142	26.15%	1.13%
89 Misc. manufactured articles	0.452	0.675	-0.223	-49.34%	-1.77%
Residual	1.824	1.88	-0.056	-3.07%	-0.44%
Total	39.945	27.332	12.613	31.58%	100.00%

2015					
Merchandise	Im. CN (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % total disc.
93 Special trans., not classified	0	0	0	--	0.00%
97 Gold, non-monetary (exl. ores)	32.063	10.882	21.181	66.06%	101.31%
54 Med. And pharm. Products	1.192	2.67	-1.478	-123.99%	-7.07%
88 Photographic appart.; Clocks	1.837	1.416	0.421	22.92%	2.01%
74 General industl. Machinery	0.863	0.7	0.163	18.89%	0.78%
73 Metalworking machinery	0.628	0.557	0.071	11.31%	0.34%
77 Elec. Machinery	0.825	0.569	0.256	31.03%	1.22%
87 Scientific equipment	0.83	0.472	0.358	43.13%	1.71%
72 Special industry machinery	0.442	0.392	0.05	11.31%	0.24%
89 Misc. manufactured articles	0.489	0.774	-0.285	-58.28%	-1.36%
Residual	2.031	1.86	0.171	8.42%	0.82%
Total	41.2	20.292	20.908	50.75%	100.00%

2014					
Merchandise	Im. CN (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % total disc.
93 Special trans., not classified	30.102*	0	30.102	100.00%	136.00%
97 Gold, non-monetary (exl. ores)	0	8.719	-8.719	--	-39.39%
54 Med. and pharm. products	1.61	2.462	-0.852	-52.92%	-3.85%
88 Photographic appart.; Clocks	1.977	1.549	0.428	21.65%	1.93%
74 General industl. Machinery	0.991	0.78	0.211	21.29%	0.95%
73 Metalworking machinery	0.684	0.67	0.014	2.05%	0.06%
77 Elec. machinery	0.873	0.621	0.252	28.87%	1.14%
87 Scientific equipment	0.881	0.523	0.358	40.64%	1.62%
72 Special industry machinery	0.732	0.556	0.176	24.04%	0.80%
89 Misc. manufactured articles	0.531	0.567	-0.036	-6.78%	-0.16%
Residual	2.16	1.96	0.2	9.26%	0.90%
Total	40.541	18.407	22.134	54.60%	100.00%

*these might be gold imports (SITC Code 97); from 2015 on classified as gold imports

2013					
Merchandise	Im. CN (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % total disc.
93 Special trans., not classified	46.307*	0	46.307	100.00%	131.54%
97 Gold, non-monetary (exl. ores)	0	11.543	-11.543	--	-32.79%
54 Med. and pharm. products	1.367	1.927	-0.56	-40.97%	-1.59%
88 Photographic appart.; Clocks	1.82	1.579	0.241	13.24%	0.68%
74 General industl. Machinery	0.8	0.648	0.152	19.00%	0.43%
73 Metalworking machinery	0.508	0.537	-0.029	-5.71%	-0.08%
77 Elec. machinery	1.092	0.595	0.497	45.51%	1.41%
87 Scientific equipment	0.832	0.555	0.277	33.29%	0.79%
72 Special industry machinery	0.77	0.599	0.171	22.21%	0.49%
89 Misc. manufactured articles	0.573	0.607	-0.034	-5.93%	-0.10%
Residual	2.123	2.397	-0.274	-12.91%	-0.78%
Total	56.192	20.987	35.205	62.65%	100.00%

*these might be gold imports (SITC Code 97); from 2015 on classified as gold imports

2012					
Merchandise	Im. CN (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % total disc.
93 Special trans., not classified	13.069*	0	13.069	100.00%	100.87%
97 Gold, non-monetary (exl. ores)	0	1.577	-1.577	--	-12.17%
54 Med. and pharm. products	1.127	1.176	-0.049	-4.35%	-0.38%
88 Photographic appart.; Clocks	2.117	1.778	0.339	16.01%	2.62%
74 General industl. Machinery	0.834	0.638	0.196	23.50%	1.51%
73 Metalworking machinery	0.648	0.508	0.14	21.60%	1.08%
77 Elec. machinery	0.974	0.566	0.408	41.89%	3.15%
87 Scientific equipment	0.792	0.492	0.3	37.88%	2.32%
72 Special industry machinery	0.861	0.598	0.263	30.55%	2.03%
89 Misc. manufactured articles	0.415	0.491	-0.076	-18.31%	-0.59%
Residual	2.047	2.104	-0.057	-2.78%	-0.44%
Total	22.884	9.928	12.956	56.62%	100.00%

*these might be gold imports (SITC Code 97); from 2015 on classified as gold imports

2012-2016					
Merchandise	Im. CN (bn $)	Ex. CH (bn $)	Disc. (bn $)	Difference in %	in % total disc.
93 Special trans., not classified	89.478*	0	89.478	100.00%	86.19%
97 Gold, non-monetary (exl. ores)	63.133	49.972	13.161	20.85%	12.68%
54 Med. and pharm. products	6.725	11.795	-5.07	-75.39%	-4.88%
88 Photographic appart.; Clocks	9.412	7.665	1.747	18.56%	1.68%
74 General industl. Machinery	4.239	3.371	0.868	20.48%	0.84%
73 Metalworking machinery	3.038	2.82	0.218	7.18%	0.21%
77 Elec. machinery	4.522	2.893	1.629	36.02%	1.57%
87 Scientific equipment	4.222	2.569	1.653	39.15%	1.59%
72 Special industry machinery	3.348	2.546	0.802	23.95%	0.77%
89 Misc. manufactured articles	2.46	3.114	-0.654	-26.59%	-0.63%
Residual	10.185	10.201	-0.016	-0.16%	-0.02%
Total	200.762	96.946	103.816	51.71%	100.00%

*these might be gold imports (SITC Code 97); from 2012 to 2014 classified as special transaction (SITC Code 93) by China

Table 21: Discrepancy by Industry; Exports to China (United Nations, 2016l)

Appendix U: Discrepancy by Industry; Imports from Kazakhstan

2016					
Merchandise	Im. CH (bn $)	Ex. KZ (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.17	2.311	-2.141	-1259.41%	87.35%
89 Misc. manufactured articles	0.055	0.043	0.012	21.82%	-0.49%
52 Inorganic chemicals	0.004	0.004	0	0.00%	0.00%
34 Gas, natural and manufactured	0	0.312	-0.312	--	12.73%
Residual	0.008	0.018	-0.01	-125.00%	0.41%
Total	0.237	2.688	-2.451	-1034.18%	100.00%

2015					
Merchandise	Im. CH (bn $)	Ex. KZ (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.108	2.348	-2.24	-2074.07%	91.02%
89 Misc. manufactured articles	0.05	0.041	0.009	18.00%	-0.37%
52 Inorganic chemicals	0.005	0.004	0.001	20.00%	-0.04%
34 Gas, natural and manufactured	0	0.255	-0.255	--	10.36%
Residual	0.035	0.011	0.024	68.57%	-0.98%
Total	0.198	2.659	-2.461	-1242.93%	100.00%

2014					
Merchandise	Im. CH (bn $)	Ex. KZ (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.768	3.93	-3.162	-411.72%	90.24%
89 Misc. manufactured articles	0.037	0.019	0.018	48.65%	-0.51%
52 Inorganic chemicals	0.004	0.004	0	0.00%	0.00%
34 Gas, natural and manufactured	0	0.221	-0.221	--	6.31%
Residual	0.226	0.365	-0.139	-61.50%	3.97%
Total	1.035	4.539	-3.504	-338.55%	100.00%

2013					
Merchandise	Im. CH (bn $)	Ex. KZ (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	1.204	3.263	-2.059	-171.01%	84.49%
89 Misc. manufactured articles	0.008	0.001	0.007	87.50%	-0.29%
52 Inorganic chemicals	0.005	0.005	0	0.00%	0.00%
34 Gas, natural and manufactured	0	0.271	-0.271	--	11.12%
Residual	0.66	0.774	-0.114	-17.27%	4.68%
Total	1.877	4.314	-2.437	-129.83%	100.00%

2012					
Merchandise	Im. CH (bn $)	Ex. KZ (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	0.574	3.441	-2.867	-499.48%	81.77%
89 Misc. manufactured articles	0	0	0	--	0.00%
52 Inorganic chemicals	0.006	0.006	0	0.00%	0.00%
34 Gas, natural and manufactured	0.002	0.197	-0.195	--	5.56%
Residual	0.877	1.321	-0.444	-50.63%	12.66%
Total	1.459	4.965	-3.506	-240.30%	100.00%

2012-2016					
Merchandise	Im. CH (bn $)	Ex. KZ (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
33 Petroleum products	2.824	15.293	-12.469	-441.54%	86.84%
89 Misc. manufactured articles	0.15	0.104	0.046	30.67%	-0.32%
52 Inorganic chemicals	0.024	0.023	0.001	4.17%	-0.01%
34 Gas, natural and manufactured	0.002	1.256	-1.254	-62700.00%	8.73%
Residual	1.806	2.489	-0.683	-37.82%	4.76%
Total	4.806	19.165	-14.359	-298.77%	100.00%

Table 22: Discrepancy by Industry; Imports from Kazakhstan (United Nations, 2016l)

Appendix V: Discrepancy by Industry; Imports from Israel

2016					
Merchandise	Im. CH (bn $)	Ex. IL (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
66 Non-metal. mineral manufact.	0.411	1.206	-0.795	-193.43%	102.58%
97 Gold, non-monetary (exl. ores)	0.061	0.044	0.017	27.87%	-2.19%
05 Vegetables and fruit	0.025	0.012	0.013	52.00%	-1.68%
87 Scientific equipment	0.024	0.013	0.011	45.83%	-1.42%
77 Elec. machinery	0.023	0.021	0.002	8.70%	-0.26%
89 Misc. manufactured articles	0.017	0.057	-0.04	-235.29%	5.16%
Residual	0.136	0.119	0.017	12.50%	-2.19%
Total	0.697	1.472*	-0.775	-111.19%	100.00%

*according to UN Comtrade $1.472bn, whereas according to Competitiveness Map only $1.466; difference of $0.006bn

2015					
Merchandise	Im. CH (bn $)	Ex. IL (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
66 Non-metal. mineral manufact.	0.401	1.259	-0.858	-213.97%	101.42%
97 Gold, non-monetary (exl. ores)	0.024	0.02	0.004	16.67%	-0.47%
05 Vegetables and fruit	0.025	0.014	0.011	44.00%	-1.30%
87 Scientific equipment	0.019	0.014	0.005	26.32%	-0.59%
77 Elec. machinery	0.019	0.016	0.003	15.79%	-0.35%
89 Misc. manufactured articles	0.018	0.043	-0.025	-138.89%	2.96%
Residual	0.143	0.129	0.014	9.79%	-1.65%
Total	0.649	1.495	-0.846	-130.35%	100.00%

2014					
Merchandise	Im. CH (bn $)	Ex. IL (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
66 Non-metal. mineral manufact.	0.456	1.181	-0.725	-158.99%	100.83%
97 Gold, non-monetary (exl. ores)	0.023	0.021	0.002	8.70%	-0.28%
05 Vegetables and fruit	0.027	0.01	0.017	62.96%	-2.36%
87 Scientific equipment	0.016	0.015	0.001	6.25%	-0.14%
77 Elec. machinery	0.014	0.013	0.001	7.14%	-0.14%
89 Misc. manufactured articles	0.016	0.033	-0.017	-106.25%	2.36%
Residual	0.155	0.153	0.002	1.29%	-0.28%
Total	0.707	1.426*	-0.719	-101.70%	100.00%

*according to UN Comtrade $1.426bn, whereas according to Competitiveness Map only $1.424; difference of $0.002bn

2013					
Merchandise	Im. CH (bn $)	Ex. IL (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
66 Non-metal. mineral manufact.	0.375	1.181	-0.806	-214.93%	111.48%
97 Gold, non-monetary (exl. ores)	0.059	0.027	0.032	54.24%	-4.43%
05 Vegetables and fruit	0.029	0.016	0.013	44.83%	-1.80%
87 Scientific equipment	0.012	0.011	0.001	8.33%	-0.14%
77 Elec. machinery	0.011	0.014	-0.003	-27.27%	0.41%
89 Misc. manufactured articles	0.013	0.015	-0.002	-15.38%	0.28%
Residual	0.15	0.108	0.042	28.00%	-5.81%
Total	0.649	1.372*	-0.723	-111.40%	100.00%

*according to UN Comtrade only $1.372bn, whereas according to Competitiveness Map $1.375; difference of $-0.003bn

2012				
Merchandise	Im. CH (bn $)	Ex. IL (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
66 Non-metal. mineral manufact.	0.288	0.912	-0.624	-216.67%	112.03%
97 Gold, non-monetary (exl. ores)	0.081	0.043	0.038	46.91%	-6.82%
05 Vegetables and fruit	0.028	0.014	0.014	50.00%	-2.51%
87 Scientific equipment	0.013	0.014	-0.001	-7.69%	0.18%
77 Elec. machinery	0.013	0.013	0	0.00%	0.00%
89 Misc. manufactured articles	0.015	0.013	0.002	13.33%	-0.36%
Residual	0.156	0.142	0.014	8.97%	-2.51%
Total	0.594	1.151*	-0.557	-93.77%	100.00%

*according to UN Comtrade $1.151bn, whereas according to Competitiveness Map only $1.131; difference of $0.020bn

2012-2016				
Merchandise	Im. CH (bn $)	Ex. IL (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
66 Non-metal. mineral manufact.	1.931	5.739	-3.808	-197.20%	105.19%
97 Gold, non-monetary (exl. ores)	0.248	0.155	0.093	37.50%	-2.57%
05 Vegetables and fruit	0.134	0.066	0.068	50.75%	-1.88%
87 Scientific equipment	0.084	0.067	0.017	20.24%	-0.47%
77 Elec. machinery	0.08	0.077	0.003	3.75%	-0.08%
89 Misc. manufactured articles	0.079	0.161	-0.082	-103.80%	2.27%
Residual	0.74	0.651	0.089	12.03%	-2.46%
Total	3.296	6.916*	-3.62	-109.83%	100.00%

*according to UN Comtrade $6.916bn, whereas according to Competitiveness Map only $6.893; difference of $0.023bn

Table 23: Discrepancy by Industry; Imports from Israel (United Nations, 2016l)

Appendix W: Discrepancy by Industry; Imports from Russia

2016					
Merchandise	Im. CH (bn $)	Ex. RU (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	1.127	0.478	0.649	57.59%	-45.16%
89 Misc. manufactured articles	0.104	0.161	-0.057	-54.81%	3.97%
68 Non-ferrous metals	0.101	1.486	-1.385	-1371.29%	96.38%
33 Petroleum products	0.08	0.735	-0.655	-818.75%	45.58%
28 Metalliferous ores; metal scrap	0.071	0.002	0.069	97.18%	-4.80%
71 Power-generating machinery	0.056	0.02	0.036	64.29%	-2.51%
93 Special trans., not classified	0	0.071	-0.071	--	4.94%
56 Fertilizers	0.005	0.064	-0.059	-1180.00%	4.11%
Residual	0.129	0.093	0.036	27.91%	-2.51%
Total	1.673	3.11	-1.437	-85.89%	100.00%

2015					
Merchandise	Im. CH (bn $)	Ex. RU (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	1.177	1.112	0.065	5.52%	-7.29%
89 Misc. manufactured articles	0.063	0.109	-0.046	-73.02%	5.16%
68 Non-ferrous metals	0.142	0.447	-0.305	-214.79%	34.19%
33 Petroleum products	0	0.39	-0.39	--	43.72%
28 Metalliferous ores; metal scrap	0	0.003	-0.003	--	0.34%
71 Power-generating machinery	0.026	0.047	-0.021	-80.77%	2.35%
93 Special trans., not classified	0	0	0	--	0.00%
56 Fertilizers	0.002	0.221	-0.219	-10950.00%	24.55%
Residual	0.241	0.214	0.027	11.20%	-3.03%
Total	1.651	2.543	-0.892	-54.03%	100.00%

2014					
Merchandise	Im. CH (bn $)	Ex. RU (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	2.404	2.037	0.367	15.27%	-141.70%
89 Misc. manufactured articles	0.071	0.334	-0.263	-370.42%	101.54%
68 Non-ferrous metals	0.291	0.108	0.183	62.89%	-70.66%
33 Petroleum products	0.03	0.38	-0.35	-1166.67%	135.14%
28 Metalliferous ores; metal scrap	0	0	0	--	0.00%
71 Power-generating machinery	0.071	0.047	0.024	33.80%	-9.27%
93 Special trans., not classified	0	0	0	--	0.00%
56 Fertilizers	0.033	0.235	-0.202	-612.12%	77.99%
Residual	0.415	0.433	-0.018	-4.34%	6.95%
Total	3.315	3.574	-0.259	-7.81%	100.00%

2013					
Merchandise	Im. CH (bn $)	Ex. RU (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	3.605	3.048	0.557	15.45%	-13.52%
89 Misc. manufactured articles	0.045	0.171	-0.126	-280.00%	3.06%
68 Non-ferrous metals	0.604	0.326	0.278	46.03%	-6.75%
33 Petroleum products	0.03	4.26	-4.23	-14100.00%	102.67%
28 Metalliferous ores; metal scrap	0	0	0	--	0.00%
71 Power-generating machinery	0.07	0.05	0.02	28.57%	-0.49%
93 Special trans., not classified	0	0.003	-0.003	--	0.07%
56 Fertilizers	0.006	0.325	-0.319	-5316.67%	7.74%
Residual	0.376	0.673	-0.297	-78.99%	7.21%
Total	4.736	8.856	-4.12	-86.99%	100.00%

2012					
Merchandise	Im. CH (bn $)	Ex. RU (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	2.317	2.154	0.163	7.03%	-2.21%
89 Misc. manufactured articles	0.034	0.128	-0.094	-276.47%	1.27%
68 Non-ferrous metals	0.389	1.026	-0.637	-163.75%	8.64%
33 Petroleum products	0.013	6.118	-6.105	-46961.54%	82.79%
28 Metalliferous ores; metal scrap	0	0	0	--	0.00%
71 Power-generating machinery	0.06	0.043	0.017	28.33%	-0.23%
93 Special trans., not classified	0	0	0	--	0.00%
56 Fertilizers	0.004	0.326	-0.322	-8050.00%	4.37%
Residual	0.266	0.662	-0.396	-148.87%	5.37%
Total	3.083	10.457	-7.374	-239.18%	100.00%

2012-2016					
Merchandise	Im. CH (bn $)	Ex. RU (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
97 Gold, non-monetary (exl. ores)	10.63	8.829	1.801	16.94%	-12.79%
89 Misc. manufactured articles	0.317	0.903	-0.586	-184.86%	4.16%
68 Non-ferrous metals	1.527	3.393	-1.866	-122.20%	13.25%
33 Petroleum products	0.153	11.883	-11.73	-7666.67%	83.30%
28 Metalliferous ores; metal scrap	0.071	0.005	0.066	92.96%	-0.47%
71 Power-generating machinery	0.283	0.207	0.076	26.86%	-0.54%
93 Special trans., not classified	0	0.074	-0.074	--	0.53%
56 Fertilizers	0.05	1.171	-1.121	-2242.00%	7.96%
Residual	1.427	2.075	-0.648	-45.41%	4.60%
Total	14.458	28.54	-14.082	-97.40%	100.00%

Table 24: Discrepancy by Industry; Imports from Russia (United Nations, 2016l)

Appendix X: Discrepancy by Industry; Imports from Nigeria

2016					
Merchandise	Im. CH (bn $)	Ex. NG (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
34 Gas, natural and manufactured	0	0	0	--	0.00%
33 Petroleum products	0.327	0	0.327	100.00%	99.09%
97 Gold, non-monetary (exl. ores)	0.004	0	0.004	100.00%	1.21%
88 Photographic appart.; Clocks	0.003	0	0.003	100.00%	0.91%
72 Special industry machinery	0.001	0	0.001	100.00%	0.30%
07 Coffee, tea, cocoa, spices	0	0.003	-0.003	--	-0.91%
08 Animal feed stuff	0	0.001	-0.001	--	-0.30%
24 Cork and wood	0	0.001	-0.001	--	-0.30%
Residual	0	0	0	--	0.00%
Total	0.335	0.005*	0.33	98.51%	100.00%

*according to UN Comtrade $0.005bn, whereas according to Competitiveness Map $0.000bn; difference of $0.005bn

2015					
Merchandise	Im. CH (bn $)	Ex. NG (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
34 Gas, natural and manufactured	0	0	0	--	0.00%
33 Petroleum products	0.479	0	0.479	100.00%	100.00%
97 Gold, non-monetary (exl. ores)	0	0	0	--	0.00%
88 Photographic appart.; Clocks	0	0	0	--	0.00%
72 Special industry machinery	0	0	0	--	0.00%
07 Coffee, tea, cocoa, spices	0	0.003	-0.003	--	-0.63%
08 Animal feed stuff	0	0.001	-0.001	--	-0.21%
24 Cork and wood	0	0.001	-0.001	--	-0.21%
Residual	0.005	0	0.005	100.00%	1.04%
Total	0.484	0.005*	0.479	98.97%	100.00%

*according to UN Comtrade only $0.005bn, whereas according to Competitiveness Map only $0.153; difference of $-0.148bn

2014					
Merchandise	Im. CH (bn $)	Ex. NG (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
34 Gas, natural and manufactured	0	0	0	--	0.00%
33 Petroleum products	0.848	0	0.848	100.00%	99.76%
97 Gold, non-monetary (exl. ores)	0	0	0	--	0.00%
88 Photographic appart.; Clocks	0	0	0	--	0.00%
72 Special industry machinery	0	0	0	--	0.00%
07 Coffee, tea, cocoa, spices	0	0.003	-0.003	--	-0.35%
08 Animal feed stuff	0	0.001	-0.001	--	-0.12%
24 Cork and wood	0	0.001	-0.001	--	-0.12%
Residual	0.007	0	0.007	100.00%	0.82%
Total	0.855	0.005	0.85	99.42%	100.00%

2013					
Merchandise	Im. CH (bn $)	Ex. NG (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
34 Gas, natural and manufactured	0	0.067	-0.067	--	-8.68%
33 Petroleum products	0.832	0	0.832	100.00%	107.77%
97 Gold, non-monetary (exl. ores)	0	0	0	--	0.00%
88 Photographic appart.; Clocks	0	0	0	--	0.00%
72 Special industry machinery	0	0	0	--	0.00%
07 Coffee, tea, cocoa, spices	0	0.003	-0.003	--	-0.39%
08 Animal feed stuff	0	0	0	--	0.00%
24 Cork and wood	0	0.009	-0.009	--	-1.17%
Residual	0.026	0.007	0.019	73.08%	2.46%
Total	0.858	0.086*	0.772	89.98%	100.00%

*according to UN Comtrade $0.086bn, whereas according to Competitiveness Map only $0.085; difference of $0.001bn

2012					
Merchandise	Im. CH (bn $)	Ex. NG (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
34 Gas, natural and manufactured	0	0.039	-0.039	--	-8.19%
33 Petroleum products	0.525	0.001	0.524	99.81%	110.08%
97 Gold, non-monetary (exl. ores)	0	0	0	--	0.00%
88 Photographic appart.; Clocks	0	0	0	--	0.00%
72 Special industry machinery	0	0	0	--	0.00%
07 Coffee, tea, cocoa, spices	0	0.02	-0.02	--	-4.20%
08 Animal feed stuff	0	0	0	--	0.00%
24 Cork and wood	0	0	0	--	0.00%
Residual	0.024	0.013	0.011	45.83%	2.31%
Total	0.549	0.073	0.476	86.70%	100.00%

2012-2016					
Merchandise	Im. CH (bn $)	Ex. NG (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
34 Gas, natural and manufactured	0	0.106	-0.106	--	-3.65%
33 Petroleum products	3.011	0.001	3.01	99.97%	103.54%
97 Gold, non-monetary (exl. ores)	0.004	0	0.004	100.00%	0.14%
88 Photographic appart.; Clocks	0.003	0	0.003	100.00%	0.10%
72 Special industry machinery	0.001	0	0.001	100.00%	0.03%
07 Coffee, tea, cocoa, spices	0	0.032	-0.032	--	-1.10%
08 Animal feed stuff	0	0.003	-0.003	--	-0.10%
24 Cork and wood	0	0.012	-0.012	--	-0.41%
Residual	0.062	0.02	0.042	67.74%	1.44%
Total	3.081	0.174*	2.907	94.35%	100.00%

*according to UN Comtrade only $0.174, whereas according to Competitiveness Map only $0.316; difference of $-0.142bn

Table 25: Discrepancy by Industry; Imports from Nigeria (United Nations, 2016l)

Appendix Y: Discrepancy by Industry; Imports from China

2016					
Merchandise	Imp. CH (bn $)	Ex. CN (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
78 Road vehicles	0.117	0.079	0.038	32.48%	0.41%
76 Telecomm.; sound equip.	1.876	0.194	1.682	89.66%	17.93%
84 Clothing and accessories	1.668	0.245	1.423	85.31%	15.17%
75 Office machines	1.512	0.148	1.364	90.21%	14.54%
77 Elec. machinery	1.14	0.376	0.764	67.02%	8.15%
89 Misc. manufactured articles	1.12	0.269	0.851	75.98%	9.07%
88 Photographic appart.; Clocks	1.033	0.262	0.771	74.64%	8.22%
51 Organic chemicals	0.812	0.408	0.404	49.75%	4.31%
69 Manufactures of metals	0.422	0.097	0.325	77.01%	3.47%
54 Med. and pharm. products	0.058	0.246	-0.188	-324.14%	-2.00%
74 General industl. Machinery	0.262	0.125	0.137	52.29%	1.46%
Residual	2.557	0.749	1.808	70.71%	19.28%
Total	12.577	3.198	9.379	74.57%	100.00%

2015					
Merchandise	Imp. CH (bn $)	Ex. CN (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
78 Road vehicles	0.095	0.174	-0.079	-83.16%	-0.81%
76 Telecomm.; sound equip.	2.141	0.208	1.933	90.28%	19.80%
84 Clothing and accessories	1.619	0.259	1.36	84.00%	13.93%
75 Office machines	1.69	0.161	1.529	90.47%	15.66%
77 Elec. machinery	1.183	0.43	0.753	63.65%	7.71%
89 Misc. manufactured articles	1.222	0.289	0.933	76.35%	9.56%
88 Photographic appart.; Clocks	0.981	0.148	0.833	84.91%	8.53%
51 Organic chemicals	0.715	0.362	0.353	49.37%	3.62%
69 Manufactures of metals	0.411	0.097	0.314	76.40%	3.22%
54 Med. and pharm. products	0.071	0.109	-0.038	-53.52%	-0.39%
74 General industl. Machinery	0.262	0.129	0.133	50.76%	1.36%
Residual	2.568	0.829	1.739	67.72%	17.81%
Total	12.958	3.195	9.763	75.34%	100.00%

2014					
Merchandise	Imp. CH (bn $)	Ex. CN (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
78 Road vehicles	0.108	0.056	0.052	48.15%	0.51%
76 Telecomm.; sound equip.	2.282	0.242	2.04	89.40%	20.05%
84 Clothing and accessories	1.758	0.284	1.474	83.85%	14.49%
75 Office machines	1.865	0.223	1.642	88.04%	16.14%
77 Elec. machinery	1.205	0.482	0.723	60.00%	7.11%
89 Misc. manufactured articles	1.015	0.199	0.816	80.39%	8.02%
88 Photographic appart.; Clocks	0.965	0.137	0.828	85.80%	8.14%
51 Organic chemicals	0.655	0.298	0.357	54.50%	3.51%
69 Manufactures of metals	0.44	0.106	0.334	75.91%	3.28%
54 Med. and pharm. products	0.116	0.099	0.017	14.66%	0.17%
74 General industl. Machinery	0.269	0.125	0.144	53.53%	1.42%
Residual	2.607	0.859	1.748	67.05%	17.18%
Total	13.285	3.11	10.175	76.59%	100.00%

2013					
Merchandise	Imp. CH (bn $)	Ex. CN (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
78 Road vehicles	0.106	0.085	0.021	19.81%	0.24%
76 Telecomm.; sound equip.	2.026	0.209	1.817	89.68%	20.63%
84 Clothing and accessories	1.655	0.401	1.254	75.77%	14.24%
75 Office machines	1.797	0.21	1.587	88.31%	18.02%
77 Elec. machinery	1.137	0.409	0.728	64.03%	8.27%
89 Misc. manufactured articles	0.981	0.328	0.653	66.56%	7.42%
88 Photographic appart.; Clocks	0.891	0.102	0.789	88.55%	8.96%
51 Organic chemicals	0.627	0.281	0.346	55.18%	3.93%
69 Manufactures of metals	0.414	0.095	0.319	77.05%	3.62%
54 Med. and pharm. products	0.066	0.11	-0.044	-66.67%	-0.50%
74 General industl. Machinery	0.225	0.113	0.112	49.78%	1.27%
Residual	2.41	1.186	1.224	50.79%	13.90%
Total	12.335	3.529	8.806	71.39%	100.00%

2012					
Merchandise	Imp. CH (bn $)	Ex. CN (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
78 Road vehicles	0.1	0.075	0.025	25.00%	0.33%
76 Telecomm.; sound equip.	1.562	0.191	1.371	87.77%	18.12%
84 Clothing and accessories	1.542	0.453	1.089	70.62%	14.39%
75 Office machines	1.434	0.256	1.178	82.15%	15.57%
77 Elec. machinery	1.09	0.474	0.616	56.51%	8.14%
89 Misc. manufactured articles	0.841	0.214	0.627	74.55%	8.29%
88 Photographic appart.; Clocks	0.846	0.099	0.747	88.30%	9.87%
51 Organic chemicals	0.537	0.262	0.275	51.21%	3.63%
69 Manufactures of metals	0.414	0.092	0.322	77.78%	4.26%
54 Med. and pharm. products	0.09	0.126	-0.036	-40.00%	-0.48%
74 General industl. Machinery	0.216	0.111	0.105	48.61%	1.39%
Residual	2.401	1.154	1.247	51.94%	16.48%
Total	11.073	3.507	7.566	68.33%	100.00%

2012-2016					
Merchandise	Imp. CH (bn $)	Ex. CN (bn $)	Disc. (bn $)	Difference in %	in % of total disc.
78 Road vehicles	0.526	0.469	0.057	10.84%	0.12%
76 Telecomm.; sound equip.	9.887	1.044	8.843	89.44%	19.35%
84 Clothing and accessories	8.242	1.642	6.6	80.08%	14.45%
75 Office machines	8.298	0.998	7.3	87.97%	15.98%
77 Elec. machinery	5.755	2.171	3.584	62.28%	7.84%
89 Misc. manufactured articles	5.179	1.299	3.88	74.92%	8.49%
88 Photographic appart.; Clocks	4.716	0.748	3.968	84.14%	8.68%
51 Organic chemicals	3.346	1.611	1.735	51.85%	3.80%
69 Manufactures of metals	2.101	0.487	1.614	76.82%	3.53%
54 Med. and pharm. products	0.401	0.69	-0.289	-72.07%	-0.63%
74 General industl. Machinery	1.234	0.603	0.631	51.13%	1.38%
Residual	12.543	4.777	7.766	61.92%	17.00%
Total	62.228	16.539	45.689	73.42%	100.00%

Table 26: Discrepancy by Industry; Imports from China (United Nations, 2016l)

Appendix Z: Interview: Federal Customs Administration

As part of the Bachelor's thesis, a questionnaire with various general and some more specific questions was sent to the Federal Customs Administration. Subsequently, René Pfister was invited to a personal interview with Matthias Pfammatter, Deputy Head of the Diffusion and Analysis Section. The interview took place on April 12th, 2018, at the Federal Customs Administration at Monbijoustrasse 40 in 3011 Bern, and lasted about one hour.

Introduction to the Interview

Pfammatter: First of all, I must inform you that it will be challenging to answer the specific questions and explain the causes of differences at detailed level. In order to be able to give a meaningful answer, mirror statistics studies need to be conducted, which usually last over several months. However, I would like to answer your question based on the knowledge acquired from mirror statistics studies that have been conducted during the last couple of years.

Pfister: Explains the Bachelor's thesis and his objectives.

Pfammatter: From methodologies each country has a certain autonomy where they can make a subdivision and leave certain things away. I spoke with my colleague who is responsible for the methodology. For example, between Switzerland and the EU there is a bilateral trade agreement and certain things were additionally regulated. With other countries, however, there are not such conventions, i.e. these countries address to the recommendations of the UN (IMTS Manual), while the UN grants certain leeway. This can be an example which causes discrepancies due to a different methodology. This leeway the UN grants is one of the main problems. Despite all efforts to establish a harmonized system, attempts are also being made to meet country-specific needs. The discrepancies are amongst other things the price you pay for the tolerance granted.

Main Part of the Interview

1. **How do the data on Swiss imports and exports come about?**

   In principle, every commercial transaction that takes place must be reported (a customs declaration needs to be filled out) regardless whether you import or export, it is a duty. There are only a few, mainly large companies, filling in customs declarations themselves. However, usually haulage companies are in charge of

completing customs declarations. Basically, these companies fill in the required data in the customs system, and subsequently forward it to the customs authority. The information on such a customs declaration is the country from which the goods come or go, the goods traded with the respective tariffisation and HS code, the value and the quantity of the goods.

2. How is the statistical value, which is required on the customs declaration, defined?

That is one of the central questions. Here it is important that the statistical value has no taxes or duties on it (no VAT, no tariffs), it is actually the raw amount. Also important is that the value always has to be in Swiss francs, i.e. for imports of foreign goods this must always be converted. If the invoice is in euros, for example, it must be converted to Swiss francs. We are aware of exchange rate fluctuations in day-to-day business and that these small details can already be a first source of discrepancies.

3. What is the quantity to be filled in on the customs declaration important for?

First of all, for the investigation of mirror statistics discrepancies is the quantity not relevant. However, the indication of the quantity is very important for Switzerland when calculating tariffs. In Switzerland we levy taxes on quantities (specific taxes) rather than on values (ad valorem). For each tariff number there is a duty rate which is calculated on 100kg. Worldwide, there is about a handful of countries levying duties on quantities, which makes Switzerland an exception. However, this methodological difference has absolutely no impact on statistics, since statistical values do not include any duties.

4. After the customs authority has received the customs declaration, is the merchandise and the information submitted verified by the customs authority?

Haulage companies usually pre-declare any imports/exports to the customs authority. The customs authority then has a so-called intervention time, which lasts for 30 minutes, to give feedback whether the merchandise has to be checked at the border or whether it can be processed without control. The customs authorities' system gives warnings for those goods classified as somewhat tricky. The respective declaration is then provisionally locked, and only unlocked after the merchandise was checked at the border. However, this only concerns a very small

percentage and is therefore rather the exception. Normally, merchandise can be settled without being controlled. It can somehow be compared to travelling by plane and the respective border controls.

5. **How are the data collected or products assigned to a specific product group? Do you use the "Harmonized System (HS)" or the "Standard International Trade Classification (SITC)", for example?**

    Switzerland assigns products to specific categories according to the Harmonized System. Here it is important that the first six digits are identical for each country and is formed by the system. However, basically each country can decide individually how detailed the categorization of products should be, or to how many additional digits, after the sixth, it wants to assign products to. For example, we (Switzerland) work with the 8-digit system, whereas Germany makes use of the 10-digit system. Therefore, depending on the number of digits in use, discrepancies can emerge, especially at detailed product level.

6. **What happens with the trade data after the Federal Customs Administration has collected it?**

    After all data has been collected, it cannot be assumed that everything has been correctly logged in. Unintentional or even intentional errors may occur. It often happens that completely wrong amounts have been entered in the system. Therefore, in the case of conspicuously large or small amounts, the Federal Customs Administration consults the respective companies, which have submitted these amounts, to uncover and correct any errors. These corrective actions are made during a time period of 14 months, before the results then are officially published. For example, the figures of 2017 are provisionally published on an ongoing basis; however, the official figures of 2017 will only be released at the end of May 2018. Therefore, the figures for 2017 can still be changed until May 2018.

    It must be said openly and honestly that everything is undertaken to avoid mistakes, but not all of them can be uncovered and cleared up. It often happens that the values, quantities and countries of origin, etc. that have been expelled are wrong. This is another reason for discrepancies in mirror statistics. Although there are various plausibility programs which recognize that certain products cannot originate from a specific country, the system cannot detect all errors. For example,

if merchandise is coming from Turkey and the Swiss freight forwarder confuses the country abbreviation of Turkey with the one of Tanzania where the product traded is available too, a mistake occurred which our system is not able to uncover. Of course, such discrepancy causing mistakes can also happen in Switzerland's partner country.

Generally, it is difficult to estimate the extent to which errors are made. However, often billions of Swiss francs have to be adjusted during the 14-month period of corrective action. Our risk analysis program automatically filters out high trading amounts so that they can be checked more closely.

After this 14-month period, the data is then published officially and subsequently reported to international organization such as the UN with their Comtrade database. Also really important for Switzerland is the statistical authority of the EU, which is called Eurostat. Under bilateral agreements with the EU, we must comply with certain conditions, including the timely submission of trade data.

7. **In which currency is the trade data reported to international organizations? What exchange rate is thereby used?**

The data we submit to these organizations is always in Swiss francs while it is the responsibility of the international organization to convert the figures to US Dollars or Euros. The question also arises here as to which exchange rate is used at what point in time. Unfortunately, that is beyond my knowledge. The application of a different exchange rate, however, can be a cause of further discrepancies. In our system, we can automatically convert the trade data to US Dollars and Euros by using the average exchange rate provided by the Swiss National Bank. However, this is only relevant to us, since we send the original data in Swiss francs to the international organizations.

8. **Does Switzerland do something different when recording imports and exports in an international comparison? If so, what?**

At this point it must be mentioned that there are two different trading systems, the general system as well as the special system. Unfortunately, I don't exactly know which or how many countries make use of one or the other system, but it is known, that the usage of different systems can cause discrepancies in mirror statistics.

Switzerland makes use of the special system, which does not include transit transactions.

9. **What is the difference between the general and the special trade system?**

The difference is that a country operating under the general trade system has to record the whole transit whereas under the special system this is not required. This is a big additional challenge that countries with the general trade system face, since they also have to comprehend the time of entry and exit of transit goods. This can become quite complicated, as several transshipments can take place. Even though we only report imports and exports and no transit in our total trade statistics, we do report transit figures in a separate statistic.

10. **Are the data from UN Comtrade compatible with the figures published by the Federal Customs Administration?**

In principle, the UN should adopt the data from us, with the only difference that could result from the use of different exchange rates.

11. **Switzerland reported an export value of $29,387bn to Spain from 2012 to 2016. However, Spain has only recorded $17,948bn of imports over the same period. How can you explain this discrepancy?**

If we have a look at this particular example, I would first like to show you the logic of collecting trade data. For example, for the recording of exports, the company/freight forwarder submitting the data to the Federal Custom Administration is obligated to specify the country of last known destination. Now the problem is that a lot of companies know that the exported merchandise is first of all going to Spain before it is re-exported to another country. However, often they do not know, where the merchandise is going afterwards, therefore they state Spain as country of last known destination.

Spain is with its big shipping ports known as a so-called trade hub. A lot of goods that are exported to Spain are afterwards shipped to South America or any other final destination, most likely in the transit procedure. This is probably for several countries the case. Therefore, it can be assumed, that a large part of this discrepancy can be explained through Spain's position as trade hub.

12. **From 2012 to 2016, a total of $27,193bn was recorded for the Netherlands, which only recorded an import value of $14,156bn. How can you explain this discrepancy?**

The Netherlands is a typical trade hub in Europe. Merchandise is shipped to the Netherlands before it is re-exported to another destination. At this point I also like to mention that there are also product specific hubs. For example for a specific product in the medical sector the Netherlands was the distribution center. So, the production company was located in Switzerland and supplied the Netherlands as large distributor. For the Swiss company, the last known destination was the Netherlands, even though the Netherlands has subsequently supplied the rest of the world unless the United States with this specific product. The only country which was directly supplied by the Swiss production company was the United States.

13. **From 2012 to 2016, Switzerland recorded a total value of $42,942bn in exports to Singapore. Singapore, on the other hand, only reported imports from Switzerland worth $20,491bn, which is less than half the value. How can you explain this discrepancy?**

Singapore and Hong Kong are classical trade hubs. There is surely a lot of goods here, where you know that this goes on somewhere regionally. However, the exporter at this time has no idea about where the merchandise goes, which is why he may state the trade hub as country of last known destination.

For example, the door industry has their distribution center in Hong Kong. Therefore, Hong Kong is often stated as country of last known destination for these products, even though the products are only distributed to another destination from Hong Kong.

14. **From 2012 to 2016, Switzerland recorded exports to China worth $96,946bn, with China reporting imports from Switzerland worth $200,762bn. China's declared import value is thus more than twice as high as Switzerland's export value. How can you explain this discrepancy?**

This discrepancy can mainly be traced back to Switzerland's exports of gold. Switzerland is a large supplier of physical gold. It is actually one of the biggest markets for Switzerland. A large part of this discrepancy can be explained through Singapore's position as trade hub for the Asian market. Many of the exports are

shipped over Singapore and are for Swiss exporters the country of last known destination even though they are re-exported to China.

At this point I also like to mention the open customs warehouses. They play a role for imports as well as for exports. I.e. there is the possibility that if we export a good to another country, it is not shipped directly to the receiver bountry but first to an open customs warehouse. For Swiss exports to China for example, a product can be firstly transferred to a bonded warehouse and as long as it is in such a warehouse, it is from China's view not regarded as import, since it has not physically entered China's statistical territory. The same applies for Switzerland's imports from another country, which are firstly processed over an open customs warehouse. We do not include these products in our import statistics, since open customs warehouses are regarded as foreign territory. Products can be for years in such bonded warehouses and therefore time lags, which result in statistical discrepancies, emerge. Especially for precious metals such as gold or artifacts it can be lucrative to put them into interim storage in open customs warehouses. Again, such products can be put into interim storage for days, months or even years. These open customs warehouses are accessible to everyone, also private persons. It is then included as export from the exporting country, however, not in the statistics from the importing country.

15. **From 2012 to 2016, exports worth $5,778bn to Israel were recorded in Switzerland. However, over the same period Israel has recorded an import value of goods from Switzerland of $22,356bn, which corresponds to a discrepancy of $16,578bn. The discrepancy mainly accrued from commodities such as petroleum and cereals. How can you explain this discrepancy?**

The problem that we have here are probably the international commodity traders that we have in Switzerland. It can be that a company in Israel buys the product from a Swiss commodity trader, which has previously bought these commodities from a different country providing petroleum. Since Israel does not know the country of origin for these commodities, it takes the address of the seller, hence the Swiss commodity trader. Therefore, such discrepancies can emerge.

16. From 2012 to 2016, Switzerland only recorded $14,458bn in imports from Russia. Russia, on the other hand, reported exports to Switzerland of $28,540bn, almost twice as high. How can you explain this discrepancy?

The Russian embassy was here once and addressed the big deviations in the trade statistics. We found out relatively quickly where that came from. I take a random example now: Glencore buys some commodity from Russia, these commodities are then shipped. However, at the time when the goods are released for export it is often not known where these raw materials are delivered to. Therefore, Russia takes as country of last known destination the address of the buyer, hence Glencore in Switzerland. These commodities, however, never enter the statistical territory of Switzerland, since it is sold by the Swiss commodity trader to any third country. This phenomenon can often be observed for petroleum, ore products, etc. Especially in Geneva we have several petroleum traders, and therefore it can often be observed for this kind of products. Therefore, Switzerland is basically a trade hub for certain commodities. Since the commodities never physically enter the statistical territory of us, they are not included in our trade statistics and these discrepancies occur.

17. From 2012 to 2016, Switzerland recorded imports from Kazakhstan worth $4,806bn, with Kazakhstan reporting exports to Switzerland worth $19,165bn. How can you explain why Switzerland records much lower imports from Kazakhstan than these exports report to Switzerland?

Here we probably have the exact same example as the one I have stated before for Russia.

18. From 2012 to 2016, Switzerland recorded total imports worth $3,081bn from Nigeria, with Nigeria reporting only $0,174bn in exports to Switzerland. How can you explain this discrepancy?

Nigeria is also known for the export of petroleum. Here I can imagine that petroleum that Switzerland buys are first sent to another country. Nigeria would due to a lack of knowledge about the country of last known destination state the country, where the products are sent before it is re-exported to Switzerland as country of last known destination. Switzerland, however, knows that these products

originate from Nigeria and therefore a discrepancy emerges. Also this discrepancy could be connected with Switzerland's large commodity traders.

Especially the petroleum market consists of a small number of large players and therefore often due to this business mirror statistics discrepancies emerge. The small number of players in this business facilitate for statistical authorities like us to better control the data accuracy. Due to the quality of petroleum it can be determined where the products originate from. Apparently, for petroleum there are large quality differences, for example, the quality of petroleum from Saudi Arabia is due to sulphur, etc. in the region not very good. Therefore, petroleum is tested and determined where it originates from before the respective data is sent to us. For a long time Nigeria has delivered high values to us and personally I have never heard from their side that the data is not compatible to ours.

The quantities of imported petroleum fluctuate extremely among countries. Delivery contracts over a certain time period are signed in this business. Thereby, it is possible that one country takes over the supply from another country at some point and so on. Therefore, for a certain time a lot of petroleum from Nigeria is imported, then Kazakhstan, Libya, etc. The supply keeps changing what makes accurate data in this business more difficult to collect.

19. From 2012 to 2016, Switzerland recorded imports from China worth $62,226bn. In contrast, China only reported exports to Switzerland worth $16,540bn in the same period. How can you explain this discrepancy?

For imports we have two countries that are considered from a statistical view, the country of origin and the country of consignment. Now, what is the problem? For a long time it was like this that something that was produced in China arrived in Rotterdam where the dealers in the EU area bought this merchandise. Then it was in the so-called "free circulation" within the EU. When the merchandise then arrived in Switzerland, it was regarded as EU-products, which in fact it was not. We have found that the country of consignment distorts the trade data enormously, which is why we requested information on the country of origin from 2012. This change has shown immediately that China is significantly more important.

The origin of the product is now shown more precisely but it is still not completely correct. That is, it may well be that if the designation of origin is not present in the

customs declaration or if, for example, no certificate of origin is required, then it may be that someone is not interested in stating where the goods come from. We have no legal means to get importers to indicate the country of origin. It is more according to the motto if it is known then the country of origin should be stated. Therefore, the trade with Europe was certainly oversubscribed on the import side and it may still is.

As I have mentioned before I see the main problem with the discrepancy of Swiss imports from China in trade over Rotterdam or Hamburg. While China states the Netherlands or Germany as country of last known destination, Switzerland states China as country of origin. Therefore, the discrepancy arises.

20. **From 2012 to 2016, Switzerland reported a total of $3,296bn in imports from Israel. Israel, on the other hand, has recorded exports to Switzerland worth $6,916bn, which corresponds to a discrepancy of $-3,620bn. How can you explain this discrepancy?**

This dimension is quite big, but maybe it can partly be explained through the following. A few years ago, at the request of Palestine, we conducted a mirror statistics study with them. Thereby, we also got to know a little bit about the surroundings of Palestine. Statistically speaking, a lot of things are processed over Israel. Switzerland is one of a few countries which explicitly states exports to Palestine. Similar to that, for example, also trade with the West Bank is statistically shown separately by Switzerland. I do not exactly know, how Israel is statistically handling the issue with the occupied zone with Palestine, but I could imagine that it is regarded as one statistical territory, whereas Switzerland differentiates. I could imagine that this could be a problem in this particular example. Therefore, imports originating from Palestine would be stated as such, whereas Israel would state exports from Israel to Switzerland. This issue affects often certain areas with political uncertainties/issues.

But in the case of imports from Israel we would need to have a closer look at the issue to be able to give a more meaningful answer why the discrepancy emerges.

Final Part

Pfammatter: From what I have seen during the presentation of your Bachelor's thesis I think that you have already covered all the discrepancy causing factors that I mentioned during the interview. Regardless of it I would like to show you some further causes of discrepancies.

- *Threshold of trade*

  Very small consignments are not included in our trade statistics. Sometimes we show them as grouped consignments, however, in the case of small single shipments, they are excluded from the statistics.

- *CIF / FOB differences*

  Imports and exports are assessed differently and can be another reason for discrepancies.

- *Time lag*

  As you have already mentioned during the presentation of your thesis, time lags play also a role for discrepancies.

- *List of merchandise / non-merchandise*

  IMTS Manual declares some products as non-merchandise, for example knotted goods or booklets. Within the EU it is clearly defined which goods are non-merchandise; it is regulated in the bilateral treaty with a so-called exemption list. However, for other countries it can be statistically different. They could for example include merchandise which is included in the exemption list and therefore regarded as non-merchandise from Switzerland.

- *The coverage with the recommendations of the UN only has to be 90%, whereas 10% is leeway*

  Can be an explanation for discrepancies that emerge from methodological practices