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Further enquiries to:

The Administrator
School of Economics and Finance
Victoria University of Wellington
P O Box 600
Wellington 6140
New Zealand

Phone: +64 4 463 5353
Email: alice.fong@vuw.ac.nz

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US-China trade: Who is telling the Truth?

Karam Shaar [a*], Ahmad Zubaidi Baharumshah [b]

[a] *Victoria University of Wellington, New Zealand*

[b] *Professor of Econometrics, University Putra Malaysia, Faculty of Economics and Management, International Finance Research Centre, 43300, Serdang, Malaysia.*

* *Corresponding author, Email: karam.shaar@vuw.ac.nz, karam-sh88@hotmail.com*

Abstract

Econometric studies investigating the US-China trade have largely retrieved data from one side only, mainly the US. There is a considerable difference between what each partner claims to have actually traded with the other. In 2013, the US-reported trade deficit with China was $346.3 billion, while the figure stood at $215.7 billion according to China's reports, which accumulates merely 62% of the former's claim. To answer the question of which data source is more reliable for research purposes, we assess the dynamic magnitude of the discrepancy for the period 1984-2013 and review the causes behind it. Through grouping the causes into two categories based on the causative factors, this study concludes there is no enough evidence to trust the data of one side more than the other. We highly encourage more in-depth studies to reconcile the data. Researchers who still prefer to utilize unreconciled data are recommended to express more caution.

Keywords: *Trade Data Discrepancy, US-China Trade, Econometric analysis*

JEL Classification: *F10, C18*

1. Introduction

It is still remembered that nearly six decades ago, in 1949, the post-Keynesian high-profile economist Joan Robinson turned down an offer for the position of Vice President of the Econometric Society, which sponsors today's top-notch academic journal, Econometrica. By then, she justified her decision on the grounds that she would not accept a position in an editorial committee of a journal she "could not read" (Saith 2008). It is reasonable to wonder whether she would make the same decision if she were offered the position today.

Like all sciences, Econometrics has never been criticism-free. This complex combination of economic theory, mathematics, and statistics has historically been the subject of denigration from mainly two perspectives. First, the opposition towards the "econometric formalism" of economic phenomena. Supporters of this notion denied the econometric techniques themselves. The main objection could be summarized by the claim that Econometrics oversimplifies macroeconomic behavior (Lucas Jr 1976). Assuming wrong models, modifying data, and applying inaccurate estimation techniques that do not account for changes in the patterns of economic behavior can result in spurious conclusions. It is claimed that the renowned Nobel Prize laureate Ronald Coase said "if you torture the data long enough, it will confess" (Tullock 2001). Lucas Jr (1976) believed the sciences of Economics and Econometrics should be recognized as two distinct disciplines, he further predicted that reconciliation along these two lines will fail in the future. Furthermore, he alleged that one of these two traditions is "fundamentally in error." Supporters of this conception seem to be mainly post-Keynesians, as John Maynard Keynes himself opposed "arid mathematical formalism" of economics (Dow and Hillard 2002). Nevertheless, tendency towards denying the key role of econometrics as a tool for economic analysis has gradually lost momentum given the recent novel advancements in econometric methods and computerization. Currently, it is the dominant research tool in economics (Johnson, Perry and Petkus 2012).

The second reason for criticizing Econometrics is the inaccuracy of data. This point goes a step backwards before raising the questions of estimation technique and model specification, which poses tough queries in today's econometric analysis. Since the inputs of a model, the data, is occasionally in error, the expediency of econometrics becomes questionable (Bagus 2011). As well stated by the celebrated econometrician Damodar Gujarati (2004), "the researcher should always keep in mind that the results of research are only as good as the quality of the data".

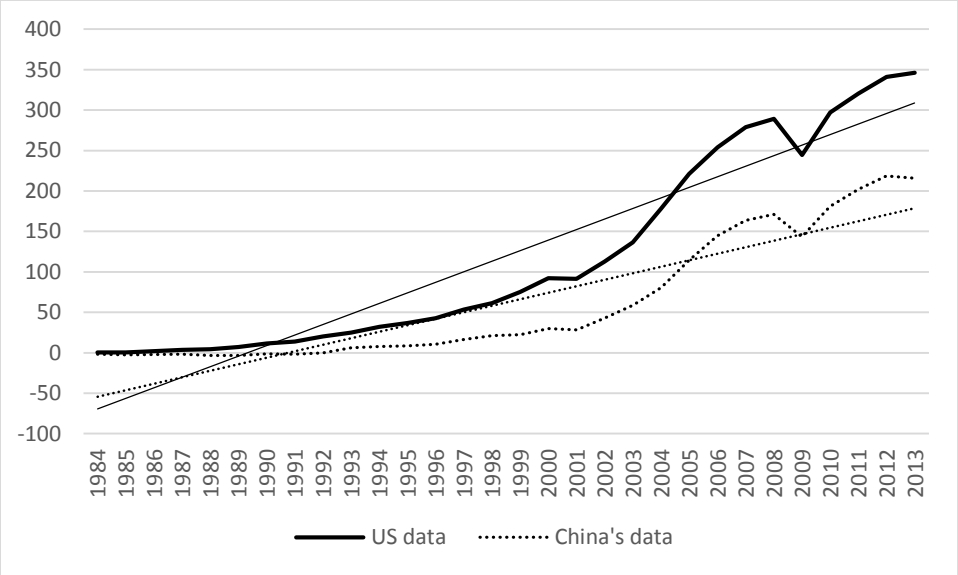
Accuracy of social sciences data can be assessed following many approaches. The simplest among all is when it is reported by more than one source, i.e. bilateral exchange rate or trade data. Unlike exchange rate, however, trade statistics could differ substantially as reported by each partner. Although trade data discrepancy is endemic globally (Ferrantino, Liu and Wang 2012), this study focuses on the US-China case for three reasons.

First, the growing global and bilateral importance of this relation as reflected by the rapidly increasing size. According to US data, total US-China trade has dramatically increased from $1 billion in 1978, when China was still the 32nd largest nation in the US export market and its 57th largest imports source, to $573 billion in 2013, where China became America's third largest export market and its greatest source of imports (Morrison 2014).

Second, the controversy over the US bilateral trade deficit with China. According to US data, it has surged over the past two decades skyrocketing from $10 billion in 1990 to $315 billion in 2013 (Flannery 2013). Alongside other factors, the deficit has strained US-China political and economic relations. In 2010 alone, the US filed three disputes against China to the World Trade Organization (WTO). The first was regarding China's subsidies to promote its wind power industries, the second about its use of trade "remedy laws" to protect domestic industries, and finally, against China's restrictions on electronic payment services (Morrison 2011).

Third, and most importantly, the substantial size of discrepancy. To clarify this point, Figure 1 calculates US-China trade balance for the period 1984-2013. The figures are in billions of US dollars. Raw data is obtained from World Integrated Trade Solution database (WITS), the World Bank. Bilateral trade balance is calculated as: China's exports minus imports with the US. Therefore, a positive value indicates Chinese bilateral trade surplus.

Figure [1]: US-China bilateral trade balance



Clearly, the magnitude of discrepancy is increasing over time. Where the difference between claims was almost $2 billion in 1984, the figure rose steeply to nearly $131 in 2013. Another prove that the discrepancy is rather increasing is the clear pattern of divergence among the trends of each series. Even with the staggering discrepancy among reports, it is widely practiced in the literature to implicitly assume that trade data suffers no inaccuracy, where researchers use the data of either side to conduct empirical analysis. In fact, most empirical studies do not even state which partner reported the data. In summary, this study investigates the following question: Which partner in US-China trade is responsible for trade data discrepancy?

2. Research Approach and Organization

To answer the research question stated above, this study takes the following approach. Section 3 first assess the state of discrepancy for the period 1984-2013 in order to clarify the problem, its magnitude, and trend. The following section descends to reviewing the studies which investigated the causes of discrepancy one by one. We focus on the numerical assessments in the literature in order to reflect the relative importance of each cause. Section 5 concludes the study by grouping the causes of discrepancy into two groups. The first groups the causes believed to be triggered by both the US and China, that is, due to the mismatch in trade data compilation methods followed in both countries. The second includes the causes believed to be triggered by either the US or China. By comparing the relative importance of each group of causes, we can build a conclusion on whether to assume the US or Chinese trade data is more accurate.

3. The State of Discrepancy

Customs in each country follow a specific classification to track their commodity merchandise for purposes of tariff imposition and economic analysis. However, most countries still report their trade statistics to international institutions such as the United Nations (UN) and World Customs Organization (WCO). In their turn, these international institutions aim to achieve unanimous scales and definitions for international trade data. Among the most used international trade classification systems come the well-known SITC of the UN and HS of the WCO (West 2010).

The Harmonized Commodity Description and Coding System, commonly known as the Harmonized System (HS), is a multipurpose international commodity nomenclature. It was adopted in 1983 and entered into force in 1988. HS is revised every 5-7 years. In its latest revision in 2012, it comprises nearly 5,000 commodity groups, which theoretically cover almost 16000 final commodities. Each group is numbered by a six-digit code. The groups are arranged in a legal and logical structure depending on the nature of the commodity. By 2013, HS has been adopted by over 200 countries and covered more than 98% of international merchandise (HS 2014).

On the other hand, the United Nations COMTRADE program under the UN Statistical Division maintains the Standard International Trade Classification (SITC). As opposed to HS, SITC structure is based on the economic functions of commodities at different stages of development. SITC is the oldest international commodity classification system. The first version was released in 1950, Revision 1 in 1961, Revision 2 in 1974, Revision 3 in 1986, and revision 4 in 2008. The latest revisions have expanded substantially. By 2005, 136 countries reported their trade data to COMTRADE and were available in SITC Revision 3 (Feenstra, Lipsey, Branstetter, Foley, Harrigan, Jensen, Kletzer, Mann, Schott and Wright 2010).

Conversion between classifications and revisions is possible through following the conversion tables provided by both institutions (Chin 2010). However, converting from a later revision to an earlier revision within the same classification is more accurate than doing the opposite (Feenstra, Lipsey, Branstetter, Foley, Harrigan, Jensen, Kletzer, Mann, Schott and Wright 2010). As a data source for the purpose of econometric analysis, SITC

classification is much more dominant in the literature compared to HS. This might be attributed to the fact that the former provides data for longer spans, yet on less levels of disaggregation. This study follows SITC nomenclature since the data starts to appear since 1984, while it starts in 1992 in HS. Raw data is downloaded from the World Integrated Trade Solution database (WITS), the World Bank. All figures are converted from thousands to billions of US dollars for the ease of charting. To assess the discrepancy, Figures 2 to 5 provide a comprehensive representation.

Figure [2]: US total imports data discrepancy

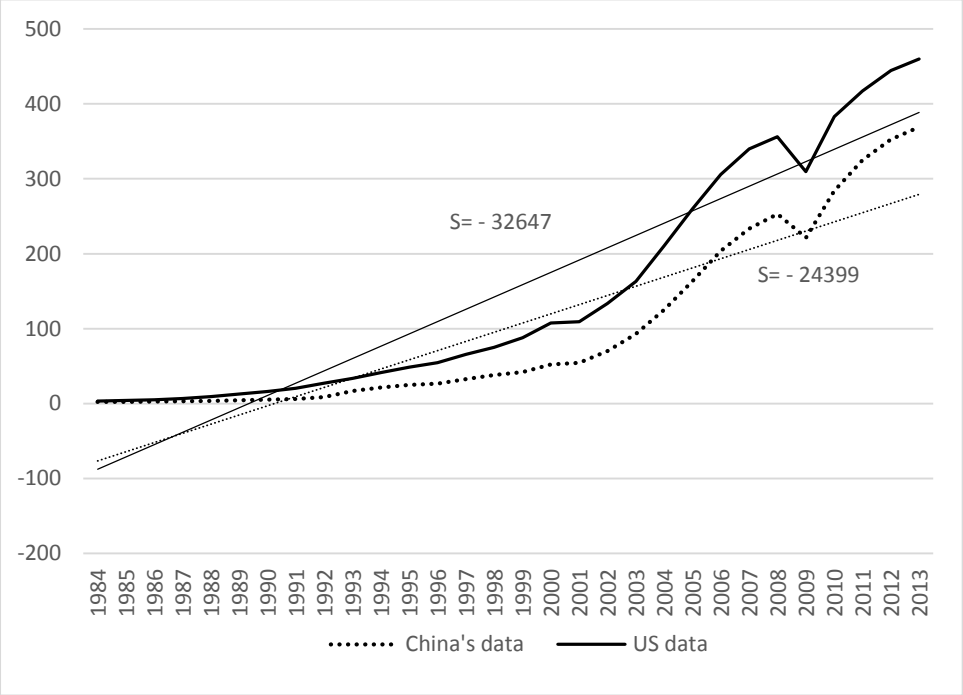
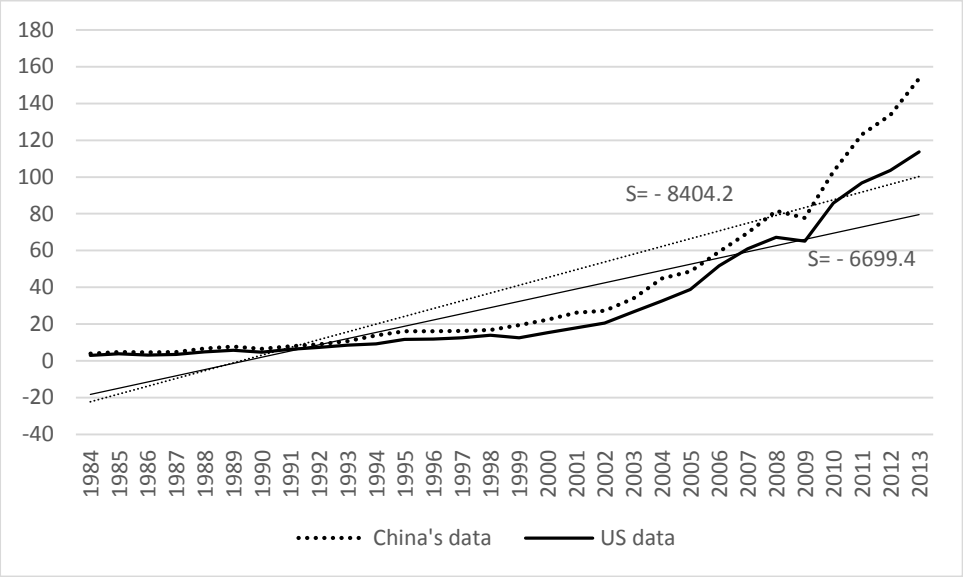


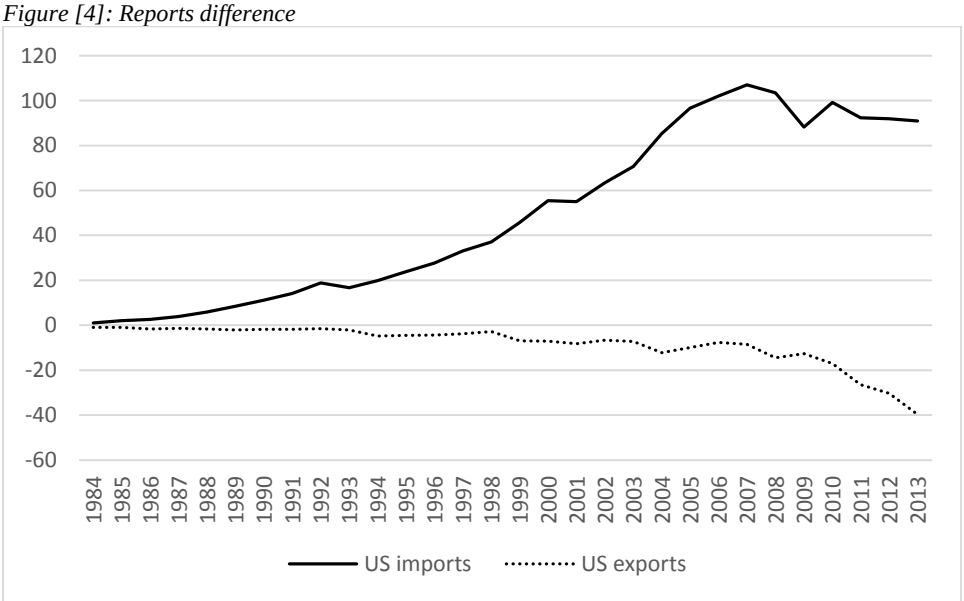
Figure 2 compares the US imports from China as reported by both partners. Apparently, along the whole period of 30 years, there is a clear discrepancy between the claims of each side. In 2013, the difference between both claims mounted $90 billion, compared to almost $1 billion only in 1984. We add a linear trend line for both reports and calculate the slope of each. As the results suggest, the size of China's slope as a percentage of US slope is almost 74.7%. Therefore, the reports are diverging.

Figure [3]: US total exports data discrepancy



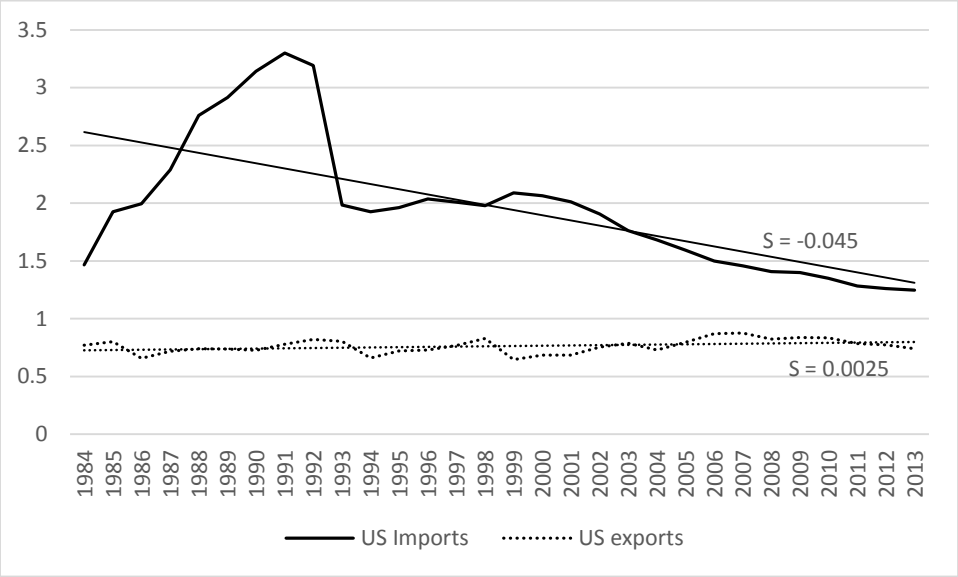
Similar to Figure 2, Figure 3 compares the US exports. Although the difference between both reports is much less for the case of US exports compared to imports, it should be noted that the size of US exports to China is also much less than its imports from it given the persistent US trade deficit with China. To capture whether the reports are converging or diverging, we again assess the slopes of the linear trends of each report. Holistically, the trend slope of US reports as a ratio to China's is 80%, which suggests divergence and provides one way to claim that future trade data divergence in the US imports is slightly higher than its exports (80%>74.7%). To clarify this, Figure 4 plots the difference between the US and China's data in each year for the cases of imports and exports.

Figure [4]: Reports difference



The suggested trends of divergence between the US and China's trade data, which was supported by Figures 2 and 3 is also supported when taking the difference between reports. In absolute value, the discrepancy in US imports is much more apparent compared to the US exports. This is attributed to the fact that the size of US imports from China is much greater than its exports. After assessing the size of the discrepancy over time, Figure 5 investigates the relative size of the US reports to China's in each year for both exports and imports.

Figure [5]: Reports ratio



By calculating the US-China reports ratio, a value equal to unity suggest no discrepancy in trade data. US imports, which had been much troubled from 1984 to 1990, is heading clearly towards unity. On the other hand, discrepancy in US imports has been much less along the whole period of 1984-2013. In summary, although the discrepancy is increasing in terms of nominal value, as Figures 2 to 4 suggest, there is a clear trend of reconciliation among reports in terms of relative size. After we shed the light on the difference between the US and China's bilateral trade data dynamically, the following points review the literature on the causes of this difference one by one.

4. Causes of Discrepancy

4.1 Timing

If a shipment leaves China in December 2013 and arrives the US in January 2014, we would expect the exporter's report to be larger in 2013 and the importer's report to be larger in 2014. If the value of the shipment is sufficiently large, this could pose a problem for monthly data. For annual data, the effect is expected to be marginal since the differences in the beginning and the end of the year are likely to balance out, unless trade is growing vastly and shipping time lag is long (Hamanaka 2012).

However, this discrepancy is more apparent in trade transported by ship, or any other slow means of transportation. Despite the high expenses, a growing fraction of US trade has been shipped recently by air. Almost 30 percent of US total trade in 1998 was air-shipped, compared to 7 percent in 1965. If the major bordering countries are excluded from the calculation in 1998, i.e. Canada and Mexico, the figure rises to almost 50 percent (Hummels and Schaur 2012).

If shipped by sea, Loraine (1995) estimated the time lag between the registration of an export and its registration as an import in the receiving country between the US and China to be a month. In the second report of the US-China Joint Commission on Commerce and Trade (JCCT Joint Report 2012) on Trade Discrepancies between the US and China, the working group estimated the adjustment of the time lag to be $0.39 and $3.05 Billion in the years 2008 and 2010, respectively. Which accounts almost 1% percent of the discrepancy in annual trade data.

4.2 The differing definitions of exports and imports

When the customs of a country evaluate a shipment, there are mainly three common international methods. The first is called Free Alongside Ship (FAS), which records the actual cost of the goods before loading to the means of transport. The second, Free on Board (FOB), records the actual cost of the goods on FAS and adds the costs of loading onboard the means of transport. The last method is called CIF, which includes the FOB, Insurance, and Freight in the value of the shipment (Ferrantino and Wang 2008; Loraine 1995).

In line with the common international practice, China evaluates its imports based on CIF. Comparatively, the US imports evaluation method is quite unique. The US reports the cost of imports only, apart from the insurance and freight, officially known as the Customs Value, which should hypothetically mirror China's exports of the corresponding shipment to the US on FOB basis. However, the US still reports the remaining two costs of Insurance and Freight in separate reports. On the other hand, while China evaluates its exports based on FOB, the US reports its exports based on FAS (Martin 2013).

In order to assure comparability among mirrored trade flows, freight and insurance costs should be either added or deducted from all merchandise data in different trade flows and partners. The mismatch in evaluation methods of trade data creates a systematic reason for trade data discrepancy. The difference between FOB and CIF values of trade is known as the FOB/CIF margin. According to US data, the margin on US trade with China has varied between 5 and 8 percent of the Customs Value in the decade from 1998 to 2007 (Ferrantino and Wang 2008).

4.3 General vs. special trade, and goods in transit

Under the mandate of the UN Statistical Office, countries can report their trade activities under two systems, regardless the commodity classification nomenclature. The first is

known as the General Trade System, in which there is no distinction between the economic and the statistical territory of a country. Thus, imports statistics include all the products that pass through the customs of a country for further processing or domestic use and adds to them all imports that are later exported again with or without further processing. Therefore, exports statistics also include products that had been previously registered as imports (Ferrantino and Wang 2008).

On the other hand, under the Special Trade System, imports statistics include only goods entering the free economic circulation area of a country, which means, the imports cleared through customs for home use or further processing, while exports include all goods leaving the free economic circulation area of the compiling country. (Ferrantino and Wang 2008). The key distinction between General and Special Trade systems is in the treatment of goods entering a bonded zone or a bonded customs warehouse without crossing into the country's borders (the economic free circulation area). The General System captures such goods in imports statistics, while the Special System will only include these goods when they are withdrawn for domestic reprocessing or consumption (Loraine 1995). In most countries, it is often indicated under which system the trade data is collected. However, not all data users are aware to report which system is being used (UN 2011).

For the case of US-China bilateral trade, China compiles trade statistics according to the Special Trade System only, while the US, in principle, compiles trade data under the General System, but still records the "consumption" trade statistics for imports. As a result, goods exported from the US which enter only bonded zones without crossing into the free circulation area of China will never be recorded in China's imports statistics, but recorded by the US as exports to China. Likewise, goods processed in China's bonded zones and re-exported to the US are recorded by the US as imports from China, although the same goods go unregistered by China (Loraine 1995). Unfortunately, no estimates for the strength of this cause of trade data discrepancy were found in the literature.

4.4 Middleman effect

In international trade, it is normally assumed that the importer is more likely to know the country of origin than the exporter is likely to know the country of final destination. If this rule of thumb holds, we would expect the importer's data to be larger compared to the corresponding data of the exporter. However, this is not necessarily always the case; there might be some types of trade where the exporter knows more about the final destination than the importer knows about the country of origin. In this case, the exporter's data would likely be larger (Ferrantino and Wang 2008).

As recommended by the UN Statistical Department, a country should attribute its imports to the 'country of origin', while exports should be registered in the country of origin as exports to the 'final known destination'. However, according to the same institution, re-exports are defined as goods imported by country (B) from the country of origin (A) and intended to be re-exported later to the country of final destination (C) with no fundamental changes in the nature of the goods (UN 2011). On the other hand, 'goods in transit' is the definition for shipments transported from country A to country C through country B,

without unloading the shipment, unless for merely changing the means of transport (Ferrantino and Wang 2008).

However, even with the official definitions stated above, the role of the third country is still surrounded with ambiguity either due to the indistinctness of the technical terms in international trade or due to the malpractices of the customs authorities in the corresponding countries. Suppose a shipment is exported from country A to B to C, a combination of possibilities could arise. However, none of which is in line with the UN recommendations:

- A reports B as the final destination
- C reports B as the country of origin
- A & B report the shipment as exports to C
- The goods are stored in B for period of time, and sold later on to another country
- B adds a markup to the value of the shipment before re-exporting to C

These asymmetries are of special concern to economists and policymakers who want to see trade statistics on 'special basis', where exports reflect the national production and imports reflect what has actually entered the national markets for consumption. Even with the numerous attempts to reconcile international trade data, re-export remains a growing phenomenon in world economy. For many major traders, including Japan and most of the European Union, re-export data are not readily available (Guo 2010).

For the case of US-China bilateral trade, as agreed by all researchers, the major cause for trade data discrepancy is attributed to the re-exporting activities of Hong Kong, which made it artificially appear as China's fourth largest trade partner in 2004 (Jingjng 2004). Still, for the US trade, re-exports constituted more than 10 percent of its total exports in 2007 (Ferrantino and Wang 2008). As noted by Fung and Lau (2003) "some Chinese exports to Central and South America, including the Caribbean countries, have been routed through US ports such as Los Angeles and Miami". It is unclear whether these exports are included in the US trade statistics as Chinese exports to the United States or as re-exports to the final destination.

The US reports offer detailed re-export data, but it only registers the country of final destination, not the country of origin. On the other hand, Hong Kong's data makes it possible to identify both sides of a re-export transaction, the origin and the destination. Nevertheless, Hong Kong's re-export data is still not fully able of capturing the complexity of shipments which pass through its ports. In 2007, over 90 percent of Hong Kong's exports represented re-exports either from China or from a third country, while the figure was merely 30 percent in the late 1970's (Ferrantino and Wang 2008).

During the nine-year period from 1997 through 2005, official Hong Kong trade data showed that Hong Kong's re-exports of Chinese goods destined for overseas markets accounted for, on average, roughly one third (almost 33%) of China's total reported exports (Liu, Kemper, Magrath and Giesze 2008). Recently, expressed as a share of US reported imports from China, the role of Hong Kong as an intermediary has shrunk rapidly. The share of Hong Kong re-exports of goods of Chinese origin has declined from about 61 percent in 1995 to about 14 percent in 2006 (Ferrantino and Wang 2008).

4.5 Misclassification of goods

In sectoral trade data, even if the values reported by both sides of a bilateral trade are equal and attributed to the right partner, there could be a possibility to impute a shipment to different categories of an international commodity classification system in each country. For instance, if a Chinese producer exports his products of medical dressings to the US, the customs of China might classify the shipment in SITC rev.1 under 54199 'other pharmaceutical goods' while the US classifies it under 54191 'Bandages, etc. impregnated/coated with pharm.pro'. This problem is only apparent for users whom want to assess particular products or industrial sectors.

Furthermore, under the Harmonized System, Chapters 98 and 99 are reserved for special programs and policies. While Chapters 1 through 97 are for classification by sector. It is not uncommon for one trading partner to record a transaction according to the actual type of good (Chapter 1-97) while another trading partner records it in Chapter 98 or 99 (Ferrantino and Wang 2008). Unfortunately, we were not able to find estimates for the strength of this cause of trade data discrepancy in the literature.

4.6 Deliberate mis-invoicing, misattribution, and smuggling

Mis-invoicing is defined as declaring the value of a shipment to be either higher (over-invoicing) or lower (under-invoicing) than the true value. There are many incentives for traders to mis-invoice their shipments, i.e. tax evasion and tariff evasion (Hamanaka 2012). On the other hand, mis-attribution is when traders make intentional false declarations concerning the origin or the destination of a shipment. The incentives for mis-attribution include taking advantage of the different tariff schemes among countries, which could guarantee the products of a specific origin or destination duty reductions or drawbacks. For instance, US importers from outside North Atlantic Free Trade Area (NAFTA) might misattribute their goods as being imported from Canada or Mexico (Hamanaka 2012).

In a study on Germany's exports to ten of trading partners, Javorcik and Narciso (2008) found using mirror statistics that the strength of discrepancy has a positive relation with the level of tariffs in eight cases out of ten. By also using mirror trade statistics, Mahmood and Azhar (2001) tested the hypothesis of over-invoicing in Pakistani exports due to the governmental duty drawback incentive scheme. The study concluded that there is a strong existence of over-invoicing across various trade partners and products. Mis-invoicing and misattribution by traders could lead to discrepancies in international trade in both value and geographical attribution (Ferrantino and Wang 2008).

In concept, smuggling can be seen as the most extreme case of under-invoicing, where a transaction goes unregistered at all, whether by the importer, the exporter, or both. In addition to the incentives of under-invoicing mentioned above, smuggling could be also driven by the fact that certain types of imports and exports are banned in some countries, i.e. certain drugs, arms, pornography, endangered species, antiques, intellectual property, etc.

Although the data itself remains in fundamental error if both partners of a bilateral trade did not register the smuggled goods, smuggling activities lead to trade data discrepancy only if goods are registered by one side of a bilateral trade. This might happen when the goods are legal in one partner and illegal in the other, if the degree of law enforcement is different among the partner countries, or if smugglers involve in misattribution of origin or destination (Ferrantino and Wang 2008).

For the case of US-China bilateral trade, China seems in the literature as the main suspect for such rogue transactions, not the US or the most important intermediary among them, Hong Kong (Ferrantino, Liu and Wang 2012). It is very difficult to estimate the value of goods smuggled out of and into China annually. However, Hong Kong customs report these rogue shipments sometimes, when the Chinese products are subsequently re-exported to a third country (Feenstra, Hai, Woo and Yao 1998).

Historically, according to data from South Korea Customs, Fei (1993) found that between January and April 1993, South Korea exported 26,688 cars to China, while China Customs declared that merely 166 cars were imported for the corresponding period. China's Customs in 1993 seized a record high 2.35 billion Yuan in smuggled goods, almost 80 percent higher than a year earlier (Chao 1994). However, some researchers claim that smuggling activities in China have dropped substantially due to government crackdown since mid-1998 (Bronfenbrenner, Burke, Luce, Hickey, Juravich, Braunstein and Epstein 2001). Fung and Lau (2001) found that "on average, taking smuggling into account increases US exports to China by a modest amount of less than $0.5 billion a year, and lowers the bilateral trade imbalance in goods by the same amount. Thus, for studies assessing data discrepancy in the recent decade, smuggling does not seem to have a substantial influence on the US-China bilateral trade discrepancy.

4.7 Geographical definition of partner countries

In some cases, the definition of statistical territory of a partner by the importer might differ from the exporter's definition. For the US-China case, the United States considers Puerto Rico and the US Virgin Islands as a part of its customs jurisdiction. On the other side, customs of China view the small islands as separate entities, thus, excludes trade with these territories in exports statistics. Generally, other US trading partners, including Hong Kong, also consider Puerto Rico and US Virgin islands as independent jurisdictions (Feenstra, Lipsey, Branstetter, Foley, Harrigan, Jensen, Kletzer, Mann, Schott and Wright 2010). Conversely, for the case of the disputed entities of Taiwan, Hong Kong, and Macau, Both partners (US and China) exclude them from their bilateral trade statistics.

However, the effect of goods exported from Puerto Rico and the United States Virgin Islands to China on US-China bilateral trade discrepancy is minor. In the second report of the US-China Joint Commission on Commerce and Trade (JCCT 2012) on Trade Discrepancies between the US and China, according to the US data, goods exported from Puerto Rico and the United States Virgin Islands to China had a value of $0.16 billion, $0.26 billion and $0.60 billion in the calendar years 2008, 2009 and 2010 respectively.

4.8 Changes in exchange rate

The registered value of a shipment may change between the date it leaves the exporting country and the date it arrives the customs of the importing country. Nevertheless, for the case of US-China trade, we would expect the effect to be ignorable since China's exchange rate regime is rigid. Therefore, the changes in exchange rate are not considered a major factor in the discrepancy in the trade figures (Martin 2013).

5. Discussions and conclusion

This study has shown there is considerable difference between the claims of the US and China regarding their bilaterl trade. However, although the discrepancy is increasing over time in terms of absolute value, it is relatively dicreasing. To answer the research question of which data source is more reliable for empirical analysis, we were able to identify eight causes for discrepancy in the literature. These causes can be grouped into two categories based on the causative factors. The first category contains the causes of which neither the US nor China can be blamed alone for the discrepancy, conversely, the discrepancy is caused cheifly due to the mismatch in data compilation practices among both parties. This category includes six causes. Namely, the timing effect, the differing definitions of exports and imports, General vs. Special trade and goods in transit, middleman effect, geographical definition of partner countries, and changes in exchange rate. As can be seen from the explanations provided in Section 4, this category contains the main two causes of the discrepancy. First, the middleman effect. Although measuring it is highly debated, it is widely accepted to be the main cause of discrepancy. For instanse, Hong Kong's re-exports of Chinese goods destined for overseas markets accounted for roughly one third (almost 33%) of China's total reported exports for the period 1997 through 2005, according to official Hong Kong trade data (Liu et al., 2008). Second, the differing definitions of exports and imports, which had caused almost 5 to 8 percent of the discrepancy in the period 1998 to 2007 (Ferrantino & Wang, 2008).

On the other hand, the second category groups the causes of discrepancy which could take place regardless the trade partner. In other words, these causes are not due to the difference in data compilation practices of the two partners, but due to the faults of one side only. This category includes two causes, the misclassification of goods and the deliberate mis-invoicing, misattribution, and Smuggling. For the case of the first cause, the author was not able to obtain any figures regarding the case of this study, bearing in mind that this cause affects sectoral data only while the literature is largely concerned with aggregate data. For the second cause, as discussed in Section 4.6, the role of smuggling and other illegal practices in US-China trade data discrepancy is marginal, especially in the recent 16 years since mid-1998 when China started cracking down on illegal trade (Bronfenbrenner, Burke, Luce, Hickey, Juravich, Braunstein and Epstein 2001). This fact is also supported by Figures 2 through 5 since no improvement can be noticed in trade data discrepancy in the few years following 1998, which suggests that the discrepancy was not that clearly affected by the smuggling activities of China.

However, even if someone assumes that all causes in the second group are solely triggered by China, these effects altogether cannot explain more than a minor fraction of the discrepancy. Since mainly both, China and the US, are together responsible for the sizable trade data discrepancy, what would make a researcher assume that data can be retrieved from either side? (please refer to Bahmani-Oskooee and Wang (2008) as an example). Limited number of studies tried to reconcile the data based on the assumption that both data sources are inaccurate. Most notably, Fung and Lau (2003), Wang, Gehlhar and Yao (2010) Ferrantino and Wang (2008), and Ferrantino, Liu and Wang (2012). However, these studies have either reconciled very short periods or focused on some causes of discrepancy rather than accounting for all causes at once. There is an imperative need for more comprehensive studies on data reconciliation. If utilizing unreconciled data in empirical analysis is inevitable, researchers are invited to notify the readers about data inaccuracy and to express more caution in interpreting the results.

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