The Role of International Outsourcing in International Trade: An Analysis of Iran-China Trade Relations

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Abstract

According to economic literature, a large part of discussion is related to trade in intermediate goods and services as an indication of international outsourcing. Gamberoni et al. (2010) have stated that trade in intermediate goods create about 60 percent of world exports. These data suggest that understanding the determinants of trade in intermediate goods is crucial to comprehend the patterns of trade.

The objective of this paper is to analyze the role of international outsourcing in form of trading intermediate products on bilateral trade relations between Iran and China. As an empirical work, we have studied the trade structure of intermediate and final goods traded between two countries during the period 1992-2011. Intermediate and final goods traded are classified into three groups: 1) electronic product, 2) automobiles and motorcycles, and 3) apparel and footwear. Observations on such products show that the share of Iran's intermediate trade with China in these three industries to total trade is about 55% on average. We have concluded that trade in intermediate goods between Iran and China has been more volatile than that of final goods. These findings confirm the same story for both developed and developing countries, which found by Chen (2010), and Sturgeon and Memedovic (2010).

Keywords: International Trade, International Outsourcing, Intermediate Goods, Global Value Chain (GVC)

1. Introduction

According to Jones and Kierzkowski (2000), if the term fragmentation suggests destruction, it is creative destruction in the Schumpeterian tradition. Breaking down the integrated process into separate stages of production opens up new possibilities for exploiting gains from specialization. Although such fragmentation is likely to occur first on a local or national basis, significant cuts in costs of international co-ordination often allow producers to take advantage of differences in technologies and factor prices among countries in designing more global production networks. The fragmentation and offshoring of production processes has been an important phenomenon for many years (Hummels, Ishii, and Yi 2001), having started in the mid-1980s in East Asia and across the US-Mexico border. Ando and Kimura (2005) and Urata (2001), for example, document the linked rise of foreign direct investment, offshoring, and parts and components trade by Japanese firms in East Asia. In North America, the 1980s saw the widespread emergence of 'twin plants' (one on either side of the US-Mexico border) under the Maquiladora programme (Dallas Fed 2002, Feenstra and Hanson 1996). Even so, these supplemental statistics illustrate the overall importance of this activity to some developing countries as over 40 percent of the total manufactures exports of Mexico, Jamaica, Haiti, Dominican Republic and El Salvador involve assembly operations using components manufactured abroad.

Antràs and Helpman (2004) have stated that growth of international specialization has been a dominant feature of the international economy. The World Trade Organization provides an example in its 1998 annual report. In the production of an "American" car, 30 percent of the car's value originates in Korea, 17.5 percent in Japan, 7.5 percent in Germany, 4 percent in Taiwan and Singapore, 2.5 percent in the United Kingdom, and 1.5 percent in Ireland and Barbados. That is, "only 37 percent of the production value is generated in the United States" (p. 36).

Veeramani (2009) has studied impact of imported intermediate and capital goods on economic growth. He has explained that endogenous growth models emphasize two important mechanisms through which the participation in international trade can raise the long-term growth rate of countries. First, trade enables the use of better (Aghion and Howitt 1992) and larger (Romer 1987) variety of intermediate products and capital equipments. Second, trade plays an important role as a transmission channel for knowledge spillovers across countries (e.g., Grossman and Helpman 1991, Coe and Helpman 1995, Coe et al, 1997, Keller 2000, 2004). Countries that use imported intermediate products and capital equipments derive benefits because these products embody foreign knowledge. Spillovers arise in this process of knowledge diffusion to the extent the imported products cost less than its opportunity costs – including the R&D costs to develop the products. Further, import might facilitate learning about the products (for example, reverse engineering), spurring imitation or innovation of competing products. Adding, trade relationships stimulate personal interaction and other channels of communication leading to cross border learning of production methods, product design, organizational methods, and market conditions.

This paper is structured as follows: Section 2 defines and illustrates the concept of international outsourcing. Section 3 analyzes the role and impacts of international outsourcing and intermediate trade on international trade flows. In section 4, we will describe trends of

intermediate and final goods trade in the world. Section 5 will study structure of intermediate and final goods trade between Iran and China in period 1992-2011, finally Section 6 will focus on concluding remarks which meet the main objective of this paper.

2. Concept of International Outsourcing

Feenstra (2004) has stated that international outsourcing refers to geographic separation of activities involved in producing a good (or service) across two or more countries. In research by Zorell (2008), value chains have been sliced up into individual tasks, some of which have been relocated to foreign countries, either in the form of in-house production offshore or as purchases of foreign intermediates at arm's length. Both modes are referred to as offshoring. To Grossman and Helpman (2005), outsourcing means more than just the purchase of raw materials and standardized intermediate goods. It means finding a partner with which a firm can establish a bilateral relationship and having the partner undertake relationship-specific investments so that it becomes able to produce goods or services that fit the firm's particular needs. Often, but not always, the bilateral relationship is governed by a contract, but even in those cases the legal document does not ensure that the partners should conduct the promised activities with the same care that the firm would use itself if it were to perform the tasks.

Antràs and Helpman (2004) have classified and nominated different kinds of strategy for producing an intermediate good: A firm that chooses to keep the production of an intermediate input within its boundaries can produce it at home or in a foreign country. When it keeps it at home, it engages in standard vertical integration. And when it makes it abroad, it engages in foreign direct investment (FDI) and intra-firm trade. Alternatively, a firm may choose to outsource an input in the home country or in a foreign country. When it buys the input at home, it engages in domestic outsourcing. And when it buys it abroad, it engages in foreign outsourcing, or arm's-length trade.

Sometimes, Offshoring and Offshore Outsourcing are used for International Outsourcing. Feenstra (2004), and Feenstra and Taylor (2008), have mentioned that Production Sharing is a good name for this concept. The term Production Sharing was conducted by management consultant Peter Drucker in Wall Street Journal, March, 1977. Hence, a variety of expressions are used for this conception by different economists that Feenstra (2004) has pointed to some of them which they can be completed:

-Outsourcing (Katz and Murphy 1992; Feenstra and Hanson 1996)
-Delocalization (Leamer 1996),
-Fragmentation (Jones 2000; Arndt and Kierzkowski 2001; Marjit and Acharyya 2003)
-Intraproduct specialization (Arndt 1998a, 1998b)
-Intramediate trade (Antweiler and Trefler 2002)
-Vertical specialization (Hummels, Ishi, and Yi 2001)
-Slicing the value chain (Krugman 1995)
-International outsourcing (Glass and Saggi 2001; Kohler 2004; Meshcheryakova 2005; -Bachmann and Braun 2011; Falk 212)
-Foreign outsourcing (Antràs and Helpman 2004; Elwell 2005)
- Production Sharing (Drucker 1977; Feenstra and Taylor 2008)

Thus, international outsourcing can be explained by intermediate goods imports from a foreign country. This is based on definition that Antràs and Helpman (2004) have classified and explained in their paper.

3. International Outsourcing and International Trade

As Sturgeon and Memedovic (2010) have stated in their study, there is a rapidly growing body of research examining the processes of geographic fragmentation, dispersion, and long distance coordination in both goods and services industries. Clearly, the rise of what are often referred to as international outsourcing is an important driver of structural change on many levels. When production becomes increasingly fragmented, or "roundabout" (Young, 1929), the increased demand for specialized intermediate goods and services draws a broader range of establishments, firms, workers, and countries into increasingly complex and dynamic divisions of labor. For nations that are very deeply integrated and economically interdependent with others, the basic structure of industries, employment, and innovation can be affected.

In theory, each segment, activity, or node in the value chain can contribute a set of highly specialized tasks and inputs to build up of finished products or services (Smith, 1776), with the dividing lines between tasks influenced by points of technological dissimilarity (Richardson, 1972) as well as the codification schemes and standards that ease the exchange of appropriate technical information between specialized tasks (Langlois and Robertson, 1995; Baldwin and Clark, 2000; Sturgeon, 2002; and Principe et al, 2003).

Such factors can influence how work is divided, not only within a factory or single firm, but also in globe-spanning business networks that link several of firms, facilities, offices, carriers, and workshops as a product or service takes shape along a value adding chain of activities. Moreover, the potential for international outsourcing formation is increasing. Advances in information technology, better codification schemes, and improvements in transport and logistics increase the potential for the geographical fragmentation of work

According to Makusen (2002) the traditional view of internationalization rests on a clear distinction between produced commodities and primary factors. According to this view, the principle of international arbitrage operates on goods prices via international exchange of goods, based on a given and well-defined underlying value-added process. In addition, it operates on factor prices—directly via international factor movements, and indirectly via the factor-price effects of trade. However, recent developments appear to challenge this view. Improvements in communications technology as well as reductions of formal and technical barriers to trade gave rise to a new vehicle of internationalization where international arbitrage cuts value-added processes into ever smaller slices produced in different locations (Jones and Kierzkowski, 1990; Harris, 1995). In contrast to traditional trade theory, a certain value-added process then no longer takes place under a uniform set of factor prices, but draws on different factor markets for different fragments. The theoretical challenge is to analyze the driving forces and effects of this process of increasing international fragmentation. It is quite obvious that this goes beyond extending trade theory to include trade on established markets of existing intermediate goods, and indeed a largely accomplished task.

Growth in exports in the 1990s was mostly in exports of technology and human capital–intensive production. They grew by around 17 percent per year as against 9 percent growth for all exports. In contrast, export growth in the 2000s was much more balanced between

sophisticated goods and goods more in line with India's static comparative advantage, natural resources and unskilled labor. In the 2000s, however, services exports with much higher human-capital intensity took off with growth of 18 percent per year. The sources of global trade growth provide no strong reasons for export pessimism. In recent years before the global crisis, high-income country imports have grown faster than GDP, driven by differentiation of goods and outsourcing of some elements of production. Developing country exports, in contrast, have risen faster than global GDP because of continuing economic integration, fragmentation of production, and specialization in globalized production networks (Shephard et al, 2011). Hummels et al (2001) have shown that growth of trade in intermediate goods is more rapid than trade in final goods.

Despite significant data gaps, recent research strongly suggests that global value chain (GVCs) and international outsourcing have become a central force driving structural change in many economies, and that their rise is likely to have triggered both positive and negative outcomes. On the positive side, Bernard et al (2006) have shown that in the United States, firms that trade tend to be larger, earn higher profits, spend more on R&D, and pay higher wages than firms that do not. Empirical research has also shown that access to a range of competitively priced foreign intermediate goods has been crucial to achieving higher productivity in both industrialized countries and recent developers such as India and China (Miroudot et al, 2009; Goldberg et al, 2008).

For developing countries, trade, investment, and knowledge flows that strengthen international outsourcing can provide mechanisms for rapid learning, innovation and industrial upgrading (Lall, 2000; Humphrey and Schmitz, 2002). GVCs can provide better access to information, open up new markets, and create opportunities for fast technological learning and skill acquisition. Because GVC-linked transactions and investments typically come with quality control systems and prevailing global business standards that exceed those in developing countries, suppliers and individuals in developing countries can be "pushed" to acquire new competencies and skills though their participation in GVCs. In the most deeply linked developing countries, these business process improvements can sometimes be felt far beyond exporting firms and sectors.

At the same time, local firms in developing countries can achieve greater success in their own markets by combining domestic and foreign intermediate inputs and creating economies of specialization that leverage cross-border complementarities. For example, border-spanning GVC linkages can potentially bring local firms into closer contact with "open innovation" systems (Teece et al, 1997 cited in Ketels and Memedovic, 2008), where firms draw on and contribute to freely available technologies and standards. Local firms can also take advantage of specialized knowledge garnered through participation in GVCs to export or set up production abroad, either directly or through contractors and suppliers.

The impact of GVCs can be easy to see on the ground. GVC-mediated trade has clearly driven investments in new productive capacity and massive infrastructure improvements, especially in key producing countries such as China, where we see huge factory complexes, sometimes employing 100,000 workers or more, churning out products that are sent to world markets through vast new port facilities. While little if any of this business or technological competency is likely to be indigenous to the "host" developing countries, it is clear enough that GVCs have boosted employment, enabled increased specialization and larger scale production, driven more efficient geographical allocation of industrial activities, and increased the availability of a

variety of intermediate goods in the developing world. As a result, GVCs tend to "compress" the development experience, making non-linear catch up possible, as has been the case in China (Whittaker et al, 2010; Breznitz, 2011).

4. Analysis of Intermediate and Final Goods Trade in the World

This section explains briefly a research that has been done by Sturgeon and Memedovic (2010). They have drawn on the United Nations (UN) COMTRADE database to examine patterns of final and intermediate goods trade. Intermediate goods can be parts and components of manufactured goods for final consumers. Trends in intermediate goods trade are indicative of GVC formation because fragmented production processes require that parts, components, and partially manufactured subassemblies cross borders—sometimes more than once—before final goods are produced and shipped to final markets (Feenstra, 1998; Arndt and Kierzkowski, 2001). They focus on trade in goods because goods-producing industries have been at the forefront of GVC development and, simply put, rich international trade statistics are only available for goods (Sturgeon et al, 2006; Sturgeon and Gereffi, 2010).

A group of data using novel classifications for final and intermediate goods trade, overall; and in three industries oft-cited as being at the forefront of global economic integration has been used: 1) electronics, 2) automobiles and motorcycles, and 3) apparel and footwear.
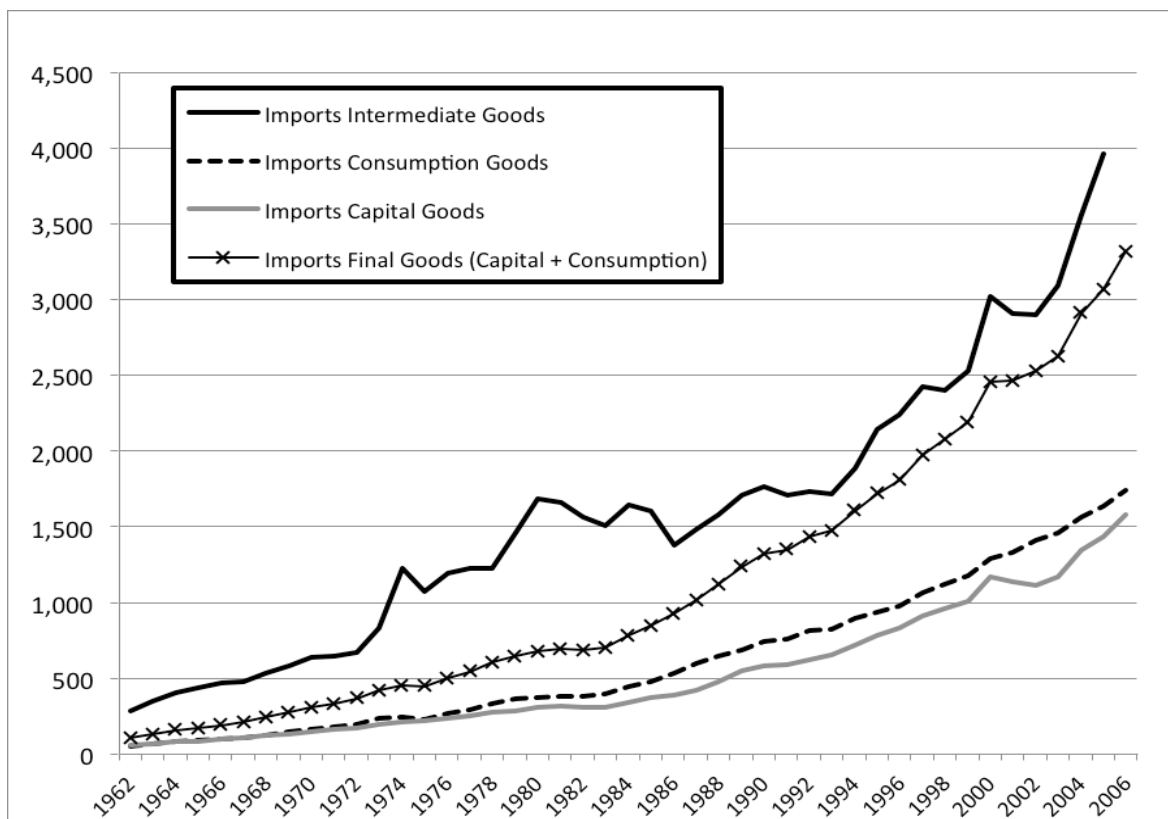

Figure 1: World imports of intermediate, capital and consumption goods 1962-2006, in Billions of Constant (2000) US Dollars, Source: Sturgeon and Memedovic (2010)

Figure 1 shows total world import growth of intermediate, capital, and consumption manufactured goods, as well as a "final goods" category, which combines capital and consumption goods taken together, for the period 1962 to 2006.

According to Figure 1, trade in intermediate goods appears to be much more volatile than trade in either capital or consumption goods. This shows the indication of recessions and business cycles, where slowdowns and downturns impact material, parts and component shipments more than final goods because final goods producers tend to draw down parts inventories and delay re-ordering during and directly after periods of uncertainty (Escaith et al, 2010). In addition, the growth of intermediate goods trade has been notable after recessions, especially US recessions, but also following bubbles in industries driving GVC development (for instance, the 1985 personal computer bubble and the 2001 "dot.com" or "technology" bubble), crises in regions deeply engaged in GVCs (the 1997 East Asian financial crisis), and worldwide slowdowns (the oil shocks of 1972 and 1979). It can be hypothesized that a similar reason has followed in the wake of the "great recession" or "financial crisis" of 2008-2009.

Also Chen (2010) has examined the role of intermediate goods in explaining large trade volatility. This topic is of great importance in analyzing the trade collapse in the crisis of 2008 and 2009. In aggregate data, trade volatility is three times greater than GDP volatility, an observation contradicting standard theories. Using input-output tables of the United States data, he identified the importance of intermediate goods in production and distinguished them from final goods. The Data showed that the final product trade volatility was dominated by the fluctuation of the intermediate goods trade.

It is well documented that companies tend to be reluctant to hire new workers after recessions, slowdowns, and crises until demand improvements are sustained, making employment a lagging indicator of recovery (Langdon et al, 2004). Related to this, however, and less well documented, is the more aggressive implementation of outsourcing and offshoring strategies, when expansion resumes, based in a similar reluctance to invest in new internal production capacity and lingering caution from recession episodes of cost cutting and downsizing. This pattern is in line with the findings from qualitative research on the electronics industry, where companies increased outsourcing and offshoring following recessions and technology bubbles in 1985, 1991 and 2001, because demand uncertainty rendered investments in internal capacity more risky. Then, as the cycles continued toward new peaks, firms reported building on successful outsourcing experiences given insufficient time to install new internal capacity to meet rapidly growing demand (Sturgeon, 2003). Overall, in different times, outsourcing and offshoring tended to become more common.

5. Analysis of Intermediate and Final Goods Trade between Iran and China

Wellman and Frasco (2010) have mentioned that China and Iran enjoy an extensive economic relationship. The two cooperate in various different sectors, including energy and construction. China has emerged as a top economic partner of Iran, investing heavily in the energy sector. In 2009, China became Iran's most significant trade partner, with bilateral exchanges worth $21.2 billion compared to $14.4 billion three years earlier. In 2011, volume of bilateral trade between Iran and China is increased to $45.09 billion. Figure 2 shows trade flows between Iran and China. The figures confirm the exponential growth in commercial ties between the two countries, which were relatively minimal 17 years prior, when trade volumes amounted to just

$400 million. According to official data, Iran imported 13% of its imports ($7.9 billion) from China in 2009. In 2009, China imported $3.12 billion worth of Iranian non-oil goods, making it Iran's second largest export market. In 2011, this digit increased to $5.652 billion, making it Iran's largest export market.

For analyzing in details, we have extracted intermediate and final goods trade between Iran and China for three groups of goods: 1) electronics, 2) automobiles and motorcycles, and 3) apparel and footwear. These data are based on UN COMTRADE standard international trade classification (SITC) Rev. 3, five digits for 1992-2011. Table 1 shows numbers of SITC five digits codes and data for three industries in period 1992-2011. Total numbers of SITC code for intermediate and final goods in these three industries is 420.

Table 1: Number of SITC Five Digits Codes and Data for Three Industries in Period 1992-2011

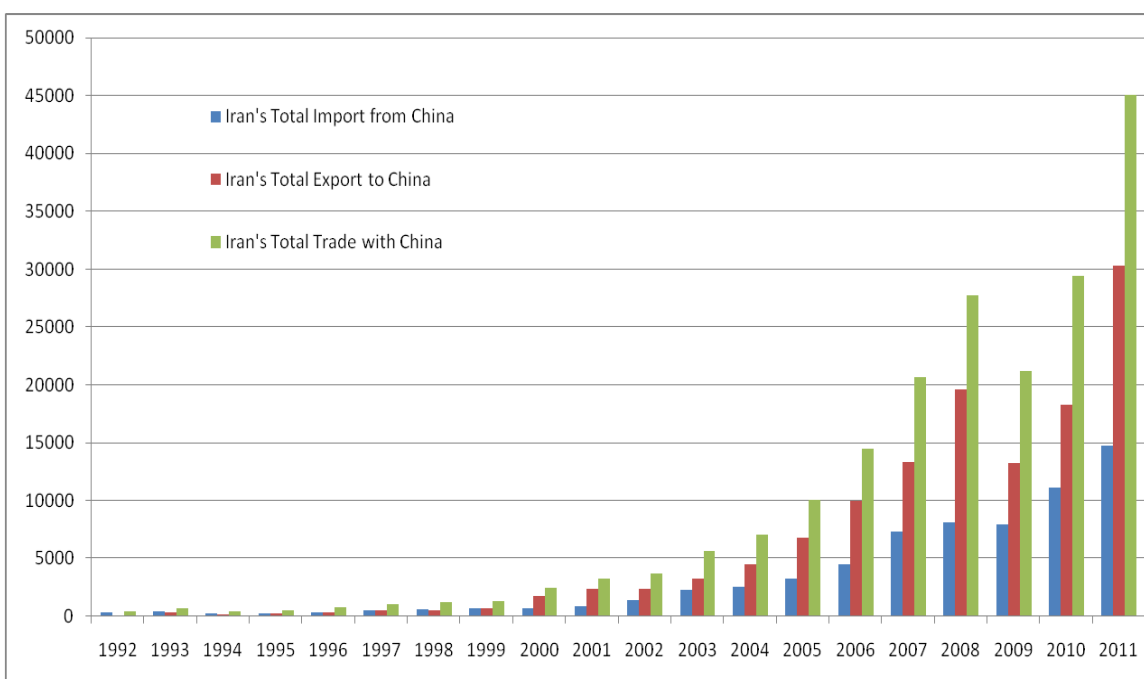| Number of SITC Codes		Number of Data in a Year	Total Number of Data in Period 1992-2011
Intermediate Goods	Final Goods		
186	234	840	16800

Source: Authors

Figure 2: Trade Flows between Iran and China, 1992 – 2011, Millions of US Dollars, Source: Authors

Figure 3 shows share of intermediate imports of Iran in these three industries to total imports in three industries from China (SIM). Total imports in three industries illustrate intermediate and final goods imports in these industries. SIM is introduced as:

$$SIM = \frac{Iran's\ intermediate\ goods\ imports\ from\ China\ in\ three\ industries}{Iran's\ total\ import\ from\ China\ in\ three\ industries} \tag{1}$$

Table 2: Statistical Characteristics for SIM1, SIX2 and SIT3 in the period 1992-2011

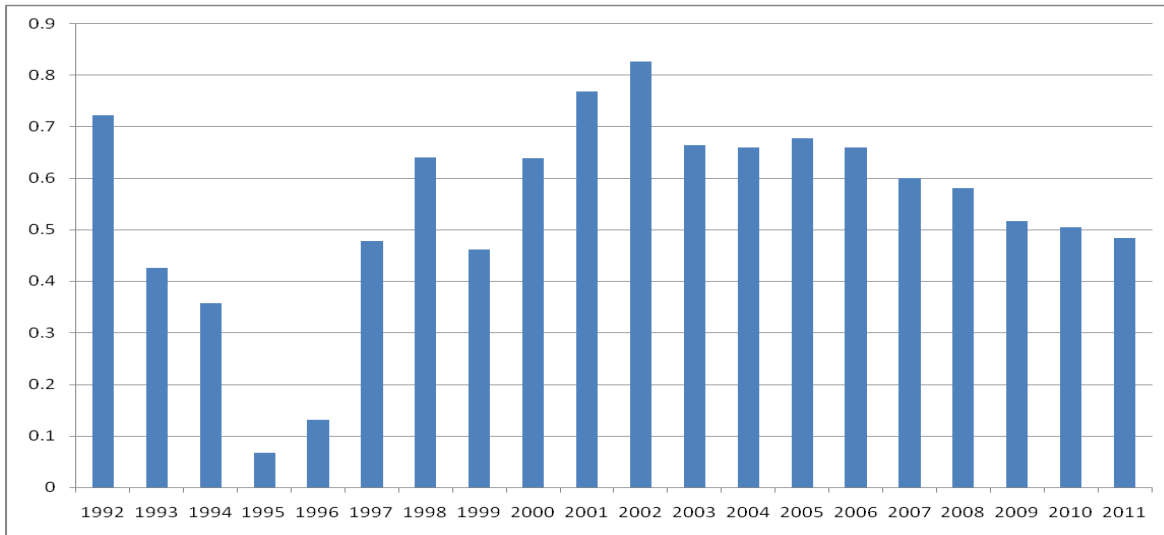| SIM			SIX			SIT		
Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
6.74%	82.77%	54.35%	53.47%	99.97%	84.35%	6.9%	82.74%	55.02%

Source: Authors

Figure 3: Share of intermediate imports of Iran to total imports in 3 industries from China (SIM), Source: Authors

Figure 3 and Table 2 shows that the lowest share was in 1995 at 6.74%, maximum share in 2002 at 82.77% and the average share has been at 54.35% for the period 1992-2011.

Figure 4 shows share of intermediate goods exports of Iran in the selected industries to total exports in the selected industries to China (SIX). Total exports in three industries illustrate intermediate and final goods exports in these industries. SIX is introduced as:

$$SIX = \frac{Iran's\ intermediate\ goods\ exports\ to\ China\ in\ three\ industries}{Iran's\ total\ export\ to\ China\ in\ three\ industries} \quad (2)$$

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[1] -Share of intermediate imports of Iran in the selected industries to total imports in these industries from China

[2] -Share of intermediate goods exports of Iran in the selected industries to total exports in these industries to China

[3] -Share of intermediate goods trade of Iran in the selected industries with China to total trade in these industries with China
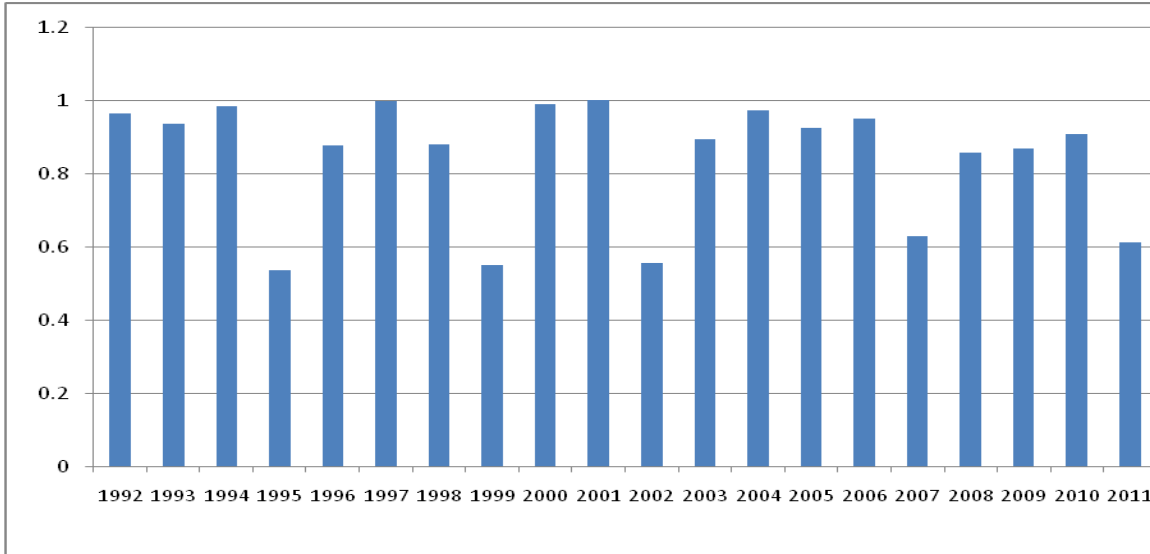
Figure 4: Share of intermediate goods export of Iran to total export in 3 industries to China (SIX), Source: Authors

Figure 4 and Table 2 shows that the lowest share is in 1995 at 53.47%, maximum share in 2001 at 99.97 and the average share has been at 84.35% for the period 1992-2011. Figure 5 shows the share of intermediate goods trade of Iran in three industries with China to total trade in three industries with China (SIT). Total trade in three industries illustrates intermediate and final goods total trade in these industries. SIT is defined as follows:

$$SIT = \frac{Iran's \ intermediate \ goods \ trade \ with \ China \ in \ three \ industries}{Iran's \ total \ trade \ with \ China \ in \ three \ industries} \qquad (3)$$

Figure 5 and Table 2 shows that the lowest share (SIT) was in 1995 at 6.9%, maximum share in 2002 at 82.74% and the average share at 55.02% for 1992-2011.
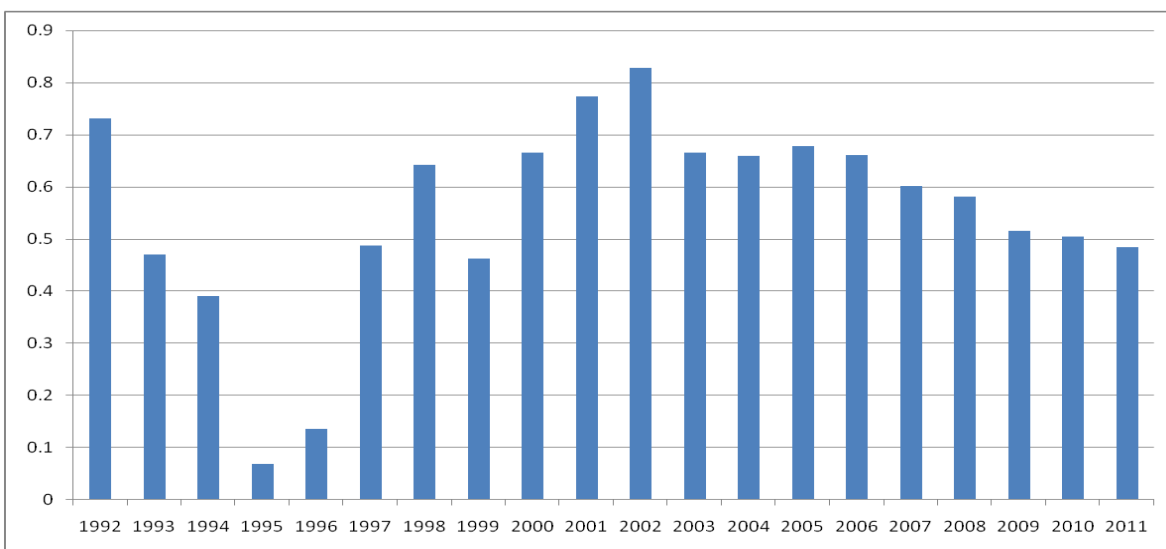

Figure 5: Share of intermediate goods trade of Iran to total trade in 3 industries with China (SIT), Source: Authors

Table 3: Statistical Characteristics of Trade in Intermediate and Final Goods between Iran and China, 1992-2011, in Millions of Constant (2000) US Dollars

Types of Goods	Iran's Imports from China				Iran's Exports to China				Iran's Trade with China			
	Min	Max	Ave	SD	Min	Max	Ave	SD	Min	Max	Ave	SD
Intermediate Goods	4.47	1240.65	393.73	400.78	0.123	6.38	1.10	1.59	4.59	1240.78	394.83	400.28
Final Goods	3.65	1321.19	287.09	367.18	0.001	0.293	0.074	0.07	3.67	1321.27	287.16	367.18

Source: Authors

Table 3 shows statistical characteristics of imports, exports and total trade volume in intermediate and final goods between Iran and China in the period 1992-2011. Also Figure 6 and Figure 7 show trends of these data. As can be seen, standard deviation of Iran's intermediate goods imports from China (400.78) is more than that of Iran's final goods imports from China (367.18). Standard deviation of Iran's intermediate goods exports to China (1.59) is more than that of Iran's final goods exports to China (0.07). Standard deviation of Iran's trade volume in intermediate goods with China (400.28) is more than that of Iran's trade volume in final goods with China (367.18). It means that imports, exports and total trade in intermediate goods between Iran and China have been more volatile than in final goods. These results confirm results that have been reached by Chen (2010) for the US economy and Sturgeon and Memedovic (2010) for the world economy.
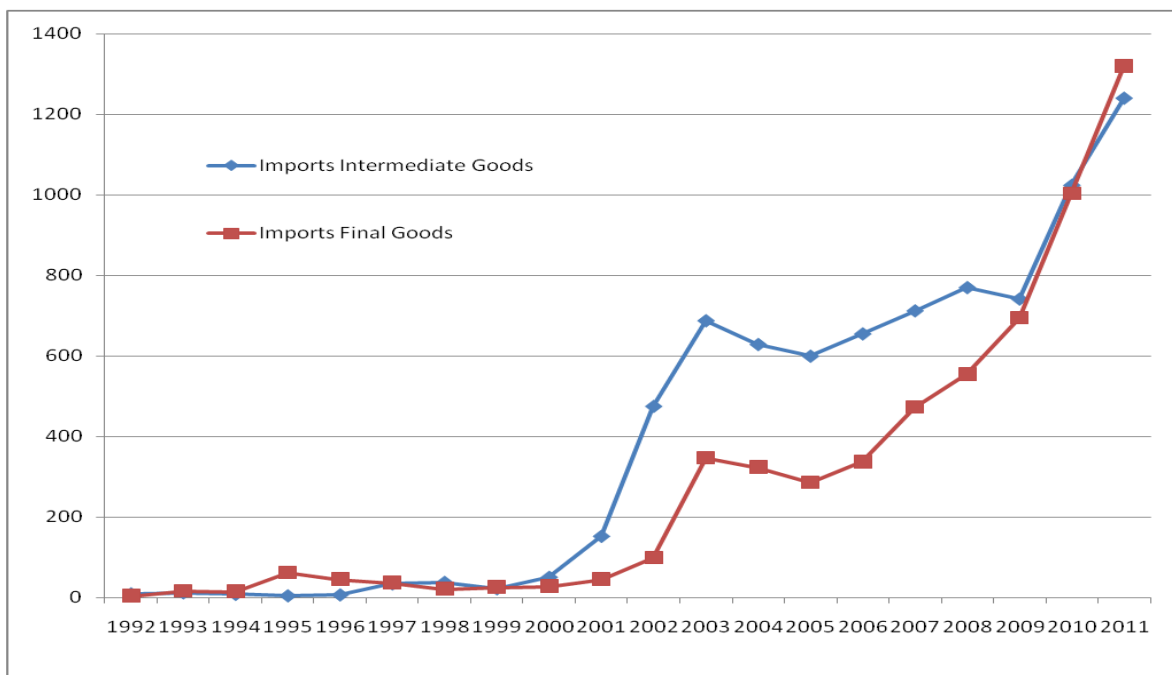

Figure 6: Iran's imports of intermediate and final goods from China in the selected industries during 1992-2011, Millions of Constant (2000) US Dollars, Source: Authors
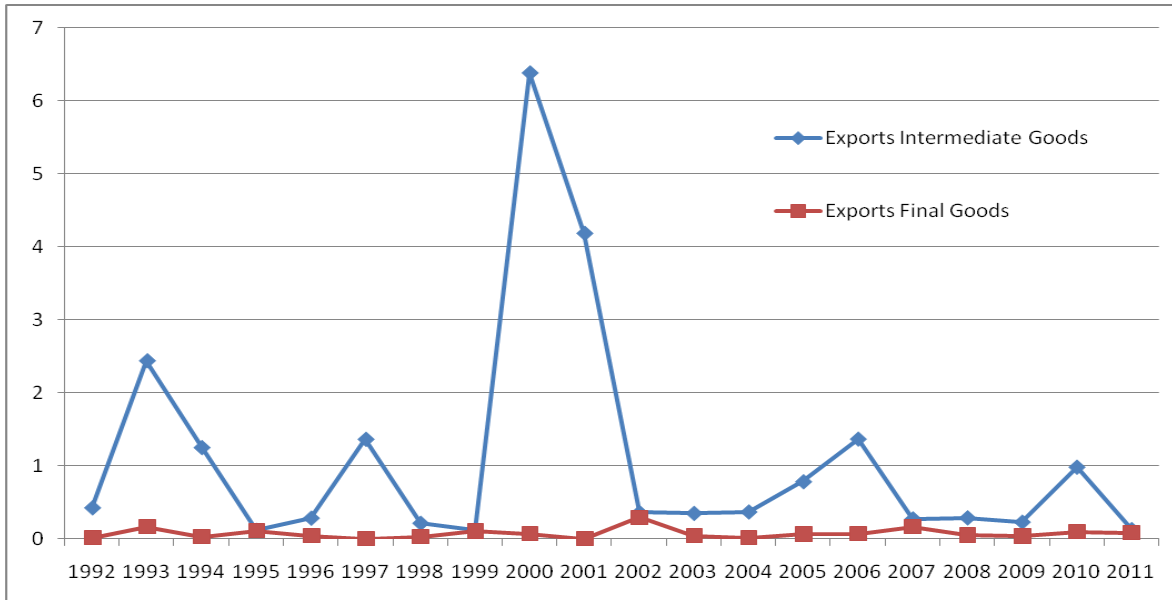
Figure 7: Iran's Exports of Intermediate and Final goods to China in the selected Industries during 1992-2011, Millions of Constant (2000) US Dollars, Source: Authors

According to Table 2, Figure 3 and Figure 4, SIX on average (84.35%) is more than SIM on average (54.35%), but Table 3 shows that average of Iran's intermediate goods imports from China (393.73 millions of Constant (2000) US Dollars) are more than that of Iran's intermediate goods exports to China (1.1 millions of Constant (2000) US Dollars) for the period 1992-2011. It means that volume of Iran's international outsourcing to China is more than China's international outsourcing to Iran in the selected industries.

6. Conclusion

In this paper, we have studied structure of intermediate and final goods trade between Iran and China in the period 1992-2011. We have extracted intermediate and final goods trade between Iran and China for three groups of goods: 1) electronics, 2) automobiles and motorcycles, and 3) apparel and footwear. Our calculations showed that Iran's international outsourcing to China was more than China's international outsourcing to Iran.

Empirical results confirmed that imports and exports in intermediate goods between Iran and China have been more volatile than in final goods. These results also confirmed those findings that have been found by Chen (2010) for the US economy and Sturgeon and Memedovic (2010) for the world economy. The implication is that economic situation can be affected more volatility through fluctuation in intermediate trade from the main trading partners.

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