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The Turkish handmade carpet industry: an analysis in comparison with select Asian countries

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The main purpose of this paper is to analyze the Turkish handmade carpet industry and to compare it with select Far East countries. In particular, the Turkish handmade carpet industry is compared with the handmade carpet industries of Iran, India, China, Afghanistan, Pakistan, and Nepal. In this context, the determinants of handmade carpets in the US market are analyzed empirically. Our results show that the Turkish handmade carpet industry has been experiencing a period of recession in the past decade. Through the relative comparative advantage (RCA) index and the Kreinin–Finger similarity (KFS) index, we observed that the RCA index for Turkey indicates that Turkey's RCA has been declining since 1992. However, despite this decline, the RCA of Turkey was above that of other countries until 1997. But after this, the advantage disappeared eventually and was gained by Iran. During this period, the other competitors of Turkey showed small increases. Furthermore, the empirical results from the gravity model suggests that a 10% real depreciation/appreciation of the US dollar against foreign currency leads to a 0.2% decrease/increase in imports. This finding suggests relatively low exchange rate import pass-through in carpet commodity. The results also support the Linder hypothesis that countries with similar preferences and demand structures will tend to trade more.

Keywords: handmade carpet industry; US market; gravity model; relative comparative advantage index; Kreinin–Finger similarity index

Introduction

The world handmade carpet trade has fluctuated in recent years. Worldwide handmade carpet imports showed a steady performance between 2004 and 2007 and reached 1.885 million US dollars (USD) in 2007. However, it declined to 1.659 million USD, with a decrease of 13.6% in 2008. As the fluctuations, both in handmade exports and imports, exhibits, there have been some problems in the handmade carpet industry and the industry has experienced a notable unsteady trend. Due to a variety of factors, the demand for handmade carpets

has been decreasing. The world handmade carpet trade statistics are given in Table 1.

The world handmade carpet and rug production and exports are generally conducted by Iran, China, Pakistan, India, Turkey, Afghanistan, Nepal, and Tibet. These countries performed 79.1% of the world handmade carpet exports in 2008. As of 2006, the share of Iran's production in the world market was 26%, that of India was 18%, that of Pakistan was 14%, that of China was 11%, and that of Turkey was 7%. Nevertheless, when we consider 2008, we observe that Iran has lost more than half of its share in the world handmade carpet exports. Turkey and China almost managed to maintain their 2006 levels in the world handmade carpet exports. The list of major exporting countries in the world handmade carpet market is given in Table 2.

In the EU market, there are six major handmade carpet exporting countries competing with each other: Iran (with 24.7% of the EU market share), India (21.3%), China (13.9%), Nepal (8.4%), Pakistan (8.3%), and Turkey (7.1%). Afghanistan does not hold an important position in the EU market (McCord, 2007). However,

Table 1. World handmade carpet trade (million USD)^a.

	2004	2005	2006	2007	2008
Export	1.655	1.817	1.751	1.691	1.940
Import	1.793	1.787	1.838	1.885	1.659

Source: International Trade Center, Trade Map, Trade Statistics for International Business Development (<http://www.trademap.org>).

^aProduct code 5701 and 570210 are included in the handmade carpet trade calculations.

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Table 2. Major exporting countries in the world handmade carpet market (million USD).

	2004	2005	2006	2007	2008	2006 (%)	2008 (%)
Iran	505.6	473.5	450.8	349.3	233.6	25.7	12.0
India	175.9	303.9	318.7	330.7	378.6	18.2	19.5
Afghanistan	6.14	5.59	6.55	7.33	240.8	0.37	12.4
China	205.1	210.2	199.2	194.3	205.1	11.4	10.6
Pakistan	249.8	283.6	244.2	219.9	186.6	14.0	9.6
Egypt	0.57	1.47	1.09	1.30	164.58	0.06	8.48
Nepal	102.4	103.8	103.9	109.5	107	6.3	6.5
Turkey	112.2	124.1	115.1	140.6	139.2	6.6	7.2

Source: International Trade Center, Trade Map, Trade Statistics for International Business Development (<http://www.trademap.org>).

these rates can show changes due to fluctuations in the world handmade carpet market in 2008 and 2009.

Handmade carpets and rugs are generally imported by Western countries with high levels of welfare. The countries with the largest import shares can be ranked as follows: the United States at 31%, followed by Germany (13%), Turkey (8%), Italy (4%), the United Kingdom (3%), France (3%), and Japan (3%). The handmade carpet imports of these countries compose 64.3% of the world handmade carpet imports. The major handmade carpet importing countries are given in Table 3.

The handmade carpet market is highly competitive. Consumer preferences in this market are changing rapidly and competition in design has become more noticeable in recent years. Nepal and India have managed to adapt to these changes rapidly, thereby becoming prominent countries in the world handmade carpet market. In China, on the other hand, production has shifted towards machine-made carpets, and increasing wages are gradually decreasing the handmade carpet manufacturing (AISA, 2007).

The main purpose of this paper is to analyze the Turkish handmade carpet industry and to compare it with a few select Far East countries. Initially, the Turkish handmade carpet industry is analyzed in detail. Afterwards, the handmade carpet industries of Iran, India, China, Afghanistan, Pakistan, and Nepal are

investigated.¹ Then, the determinants of handmade carpets in the US market are analyzed empirically. Finally, our results are discussed.

Turkish handmade carpet industry

In contrast to the machine-made carpet manufacturing that is generally located in the southeast Anatolian region, handmade carpet production is widespread throughout Turkey (Surek, 2008). Handmade carpet manufacturing, which is adopted in almost every locale of the country as carpet weaving on looms, takes place in several locations throughout the country. It has been observed that in recent years, production has shifted from western regions to eastern regions due to the lower labor costs. Handmade carpet manufacturing in Turkey is mainly carried out by unorganized local family businesses. In addition to the cooperative associations established by local administrations and Sumer Hali, people weave carpets at home and sell them in the markets.

It could be said that the Turkish handmade carpet industry has been going through a recession period in the past decade. In contrast to the share of machine-made carpets in total carpet exports, which has been increasing, the share of handmade carpets has been decreasing, which clearly indicates a recession in the industry. The share of machine-made carpet exports in

Table 3. Major importing countries in the world handmade carpet market (million USD).

	2004	2005	2006	2007	2008	2006 (%)	2008 (%)
USA	617.9	645.9	652.3	622.6	511.2	35.5	30.8
Germany	337.8	293.5	286.8	283.7	219.3	15.6	13.2
Turkey	47	58.9	89.2	117.0	128.5	4.9	7.7
Free Zones	50.2	60.6	55.7	63.7	65.6	3.0	4.0
Italy	103.5	97.6	94.3	97.4	68.7	5.1	4.1
UK	72.1	64.8	67	64.7	52.7	3.6	3.2
France	47.1	46.4	43.9	46.6	45.3	2.4	2.7
Japan	60.6	61.9	58.9	55.5	41.9	3.2	2.5

Source: International Trade Center, Trade Map, Trade Statistics for International Business Development (<http://www.trademap.org>).

total carpet exports was 71% in 2002 and rose to 85% in 2006 and 86% in 2007. Conversely, the share of handmade carpet exports was 29% in 2002 and fell to 15% in 2006 and 14% in 2007.² Furthermore, the total value of handmade carpet exports, which was 145 million USD in 1996, declined in the 2000s and only barely reached its 1996 level in 2007.

In spite of its problems in the handmade carpet and rug industry, Turkey holds an important position in the world market for machine-made carpets. Turkey ranks sixth among world machine-made carpet exporting countries, with a share of 6% (Alkan, 2008). In addition, Turkey's machine-made carpet exports are growing at a faster rate than the world machine-made carpet imports. This indicates that Turkey's market share in the world machine-made carpet market is gradually increasing. The most important market for Turkey's machine-made carpet exportation is that of the EU (EU-27) countries: 25.1% of the total machine-made carpet exports of Turkey go to the EU market.

Turkey also ranks seventh in the world among handmade carpet exporting countries, with a share of 7.2% in 2008. It could be said that Turkey's handmade carpet exports are following a trend similar to that seen in the world handmade carpet imports. In 2007, Turkey's handmade carpet exports were about 145 million USD, which represented a 31% increase over the previous year (ITKIB, 2008). It is necessary to mention that the share of Turkey's handmade carpets that are exported from the free-trade zones is high. For instance, 52% of handmade carpet exports in 2005 were made from the Istanbul AHL free trade zone and the Kocaeli free trade zone (Undersecretariat of the Prime Ministry for Foreign Trade, 2007). As of 2007, the share of exports from the free trade zones was 45%.

In 2007, handmade carpets valued at 57.2 million USD (a 67.7% increase over the previous year) were exported to other OECD countries, which represent the highest share of Turkey's handmade carpet exports at 39.4%. The countries with the highest share in this country group were the United States (27.3%) and Japan (9.4%). The share of EU member countries in Turkey's handmade carpet exports was 10.7%. Other markets that have an important share in Turkey's handmade carpet exports (as of 2007) were Italy (with a share of 2.4%), France (1.5%), Spain (1.2%), Turkish Republic of Northern Cyprus (T.R.N.C.) (1.2%), and Australia (1%). On the other hand, as can be observed from Table 4, the top 10 countries in handmade carpet exports as of 2007 were the United States, Japan, Italy, France, Spain, T.R.N.C., Australia, United Kingdom, Germany, and Iraq, in that order (ITKIB, 2008).

Turkey's carpet imports statistics show that there has been a continuous increase in carpet imports in recent years. As a matter of fact, Turkey's total carpet imports were about 57 million USD in 2002 and reached 184 million USD in the January–November period of 2007. In the January–November period of 2007, machine-made carpet imports totaled 69 million USD, whereas handmade carpet imports were 115 million USD. On the other hand, while machine-made carpet imports were decreasing after 2005, handmade carpet imports kept increasing at higher rates. Indeed, with the signing of Customs Union Agreement with the EU, handmade carpet and rug imports increased gradually, from their 12 million USD level in 1996, to 51 million USD in 2005, and up to 115 million USD as of the January–November period of 2007. As of 2008, Turkey ranks third in the world among handmade carpet importing countries, with a share of 7.7%. As a result, it can

Table 4. The top 10 countries in the handmade carpet exports of Turkey.

Countries	2006 January–December		2007 January–December	
	Handmade carpet exports (million USD)	Share in total carpet exports (%)	Handmade carpet exports (million USD)	Share in total carpet exports (%)
USA	24.600	22.2	39.659	27.3
Japan	6.933	6.3	13.662	9.4
Italy	3.869	3.5	3.542	2.4
France	1.307	1.2	2.192	1.5
Spain	1.597	1.4	1.782	1.2
Turkish Republic of Northern Cyprus	73	0.1	1.672	1.2
Australia	735	0.7	1.530	1.1
United Kingdom	1.522	1.4	1.507	1.0
Germany	1.700	1.5	1.455	1.0
Iraq	1.476	1.3	1.392	1.0
Total export of top 10 countries	43.812	39.6	68.393	47.2
Total handmade carpet export	110.652	100	145.009	100

Source: ITKIB (2008).

be said that the increase in imports is one of the most important problems in the Turkish handmade carpet sector. The countries that Turkey is importing most of its carpets from were China, India, and Pakistan. The reason that Germany's share of Turkish imports is high is that Far East carpets are often imported over Germany.

Carpet industry of select Asian countries

Iranian carpet industry

Iran is one of the world's prominent carpet manufacturers and exporters. The carpet industry is one of the most important industries in the Iranian economy. Iran manufactures more than 5 million m² of handmade carpets and exported around 500 million USD annually between 2004 and 2006. However, handmade carpet exports of Iran decreased dramatically after 2006 and declined to 233.6 million USD in 2008. Indeed, a downward trend has been observed in Iranian carpet exports since the 1990s.

According to carpet manufacturers, the main reason for this decline is weak support in foreign markets. Iranian carpet manufacturers believe that they are moving away from the global advertisement industry. Because of these reasons, Iranian manufacturers are not endowed with sufficient resources to compete in international markets.

There are also some internal factors, such as low quality and high costs, which hinder the competitive power of Iranian handmade carpets in international markets. Indeed, marketing and sustention costs are high in Iran (Bakhshandeh, 2006). Moreover, to a large extent, the manufacture of carpets in private homes makes it almost impossible to control the industry. Therefore, the industry is not able to meet and fulfill the preferences and demands of foreign consumers. In Iran, 90% of carpets are woven in rural areas, where weavers do not have enough information about the demands of customers in international markets.

Another reason for the decrease is the flow of low-cost carpets into the world market from countries such as China, India, Pakistan, and Afghanistan. Consequently, world-renowned Iranian carpets have been confronted by unfair competition from low-cost, imitation carpets from countries such as mentioned above. These countries have captured the handmade carpet market. For instance, China has captured some part of the Iran's carpet market share in the United States by imitating Iranian carpets and producing low-quality carpets (Bakhshandeh, 2006).

Despite the declines in recent decade, Iran is still one of the largest carpet exporters in the world. Handmade carpet exports rank first among Iran's non-petrol exports and third in Iran's total exports. Carpet manufacturing

constitutes 12% of Iran's non-petrol exports. Iranian handmade carpets are exported to more than 20 countries. Its main export markets are Germany, the United States, Persian Gulf countries, Italy, Japan, Russia, and Tunisia. The United States and Germany capture 60% of Iranian carpet exports.

The carpet industry is very important for Iranian economy in terms of generating employment, growth, creating added value for non-petrol industries, and exports (Bazargani, 1997). Many people make a living by carpet weaving. The carpet industry also provides the most important job opportunities in rural areas. Throughout the country, more than 200,000 weavers and approximately 2 million people work in the industry (Bakhshandeh, 2006). It is reported that nearly 5 million Iranians work in jobs related to carpet industry. Currently, throughout the country, the carpet industry employs most of the women. In 1996, carpet production occurred at 1.2 million looms located in 210 towns and 27,000 villages (Iran Commerce, 2000). Today, this number has decreased to 1 million looms (Sobhe, 2008). Kerman, Kashan, Tabriz, Esfahan, Shiraz, Hamadan, Arak, and Mashhad are the main cities for carpet manufacturing in Iran.

Iran is searching for policies to protect its handmade carpet industry against unfair competition from other countries. The Iranian government has prepared several reforms in order to help the industry to minimize losses. Moreover, the Iranian carpet industry is working on a distinctive brand identity that will ensure the authentication and originality of its carpets on the world market. Furthermore, the Iranian government has planned to eliminate the export of low-quality carpets by controlled licensing through the Association of Carpet Exporters of Iran (Keshavarzian, 2006, p. 190). In addition, Iran is asking for intellectual property rights for designs, models, and brands in order to compete with other countries' imitation and cheap carpets. Iran also strives to increase the education level of weavers in order to manufacture high-quality carpets. It is obvious that the Iranian government regards it as a public service to protect the image of Iran's carpets in the world by preventing the imitation of Iranian models, restricting the sale of non-Iranian carpets as "Iranian", and limiting low-quality carpet exports from Iran (Keshavarzian, 2006, p. 190).

Indian carpet industry

Indian carpets have become famous in the world for their elegant design, stylishness, attractive colors, craftsmanship, and workmanship. The rapidly developing Indian carpet industry is famous for its adaptation, innovativeness, and ability to adjust to changes.³ Besides, India has a great price advantage in both European and

American markets by manufacturing handmade carpets at approximately the same prices as machine-made carpets.

India exports 90% of the carpets that it produces. The United States ranks first in India's export destinations with 49% of India's carpet exports and Germany ranks second with 153.5 million USD valued exports. These two countries are followed by the United Kingdom, Japan, and Australia. India has attempted to extend its target markets by conducting sales to countries, such as Poland, which have developing economies and can buy handmade carpets.

Carpet production centers in India are specialized in different fields. Bhadohi is the main carpet production center of the country. Kashmir, which is located in the north, specializes in silk carpet production. Panipat specializes in tufted carpets, which use blends of traditional and modern designs. In Jaipur and Agra, handmade carpets are produced (USAID, 2006, p. 68). Due to its crowded population, India has a large cost advantage over its competitors in handmade carpet production. Although the economy is developing, approximately 25% of the people are under the poverty threshold. For this reason, labor-intensive carpet production is socio-economically very important, and approximately 3 million people work in carpet industry in India.

India has shown increasing performance in terms of handmade carpet exports. India has more than doubled its handmade carpet exports from 2004 to 2008. The Indian carpet industry has made great progress with the strategies exercised by the Indian Carpet Export Promotion Council. Therefore, India has an important place in the world handmade carpet trade. However, the unit value of exported carpets from India is still low. Woolen carpets, rugs, Indian druggets, durry rugs, and similar products constitute the highest exported product group, 59% of India's 2007–2008 handmade carpet exports. Silk carpet exports are 6% of total carpet exports. Providing a wide product range, the Indian carpet industry is developing in terms of both value and volume. Estimates are that in approximately 5 years, Indian carpet exports will exceed 3 billion USD (Srivastava & Goswami, 2007).

Chinese carpet industry

Chinese handmade carpets have an important position in the world carpet market. China is able to produce handmade carpets of different qualities and at several price intervals. As in many other industries in China, increasing labor costs have a potential to weaken the competitive power of China in the handmade carpet industry. A large part of production in China is tufted carpets, and in this market, China competes with India. China is competing in the middle segment of the market

by producing high-quality machine-made carpets. By producing machine-made carpets at low price and high quality, it competes with handmade carpets as well. This has made things difficult for other handmade carpet producers, forcing them to develop different strategies (USAID, 2006, p. 68).

In the 2002–2005 period, China's handmade carpet exports demonstrated on average a greater than 20% increase per annum. But after 2005, handmade carpet exports declined, and in 2008, China managed to reach only the level of 2005. China's carpet exports are primarily to the United States and Japan. In the United States and Japan, one out of every five handmade carpets is made in China.

The improvement in Chinese handmade carpets generates great social benefits for agriculture, rural areas, and farmers. Since they require intensive labor, Chinese handmade carpets have an important role in terms of both employment, especially for rural areas, and regional economic development. For instance, in Ningjin city of Shandong State, the carpet industry constitutes 25% of the total private sector. In Qianan city of Hebei State, the carpet industry provides employment for 12,000 people. In 2005, the carpet industry provided employment for 20,000 people in Qinghai State.

The number of handmade carpet producers in China has been growing. As of 2002, there were 1080 firms operating in the carpet industry in China. Leading firms of the industry consider technological improvements very important and have independent design rooms. Some firms even have independent research and development (R&D) and training centers that employ about 100 technical personnel. For instance, between 1995 and 2005, Qianan Carpet Corporation created 9000 different designs, which were in high demand in overseas countries. The Qinghai Tibetan Sheep Carpet Corporation has developed 100 new products and holds six patents in carpet weaving and techniques.

Like many other carpet-producing countries, China exports a great portion of its carpets. The markets for Chinese carpets are extending both locally and globally. While the Chinese carpet industry is becoming more competitive in the world market, there exists a market with great potential within China itself. In 2004, local consumption in China reached 80 million m², and this consumption is increasing by 10% per annum.

Afghan carpet industry

The carpet industry is one of the most important industries of the Afghan economy. The carpet industry has the potential to support the structural change and transformation of the Afghan economy (Banwal, 2005). It is a prominent industry in terms of exports and is an

important source of employment and income for the population in rural areas (AISA, 2005). In general, labor-intensive carpet production is widespread throughout the country. Carpet production is mainly concentrated in the northern region; Kabul is one of the new production centers. Although in other countries weavers are mostly women, in Afghanistan, men also weave carpets.

According to the Afghan Carpet Exporters Guild, over 1 million people work in carpet manufacturing. Millions of people work in related areas such as wool production, carpet cutting, washing, and design. For this reason, the carpet industry is one of the main industries on which both the Afghan government and its private sector companies are focused. More than 95% of carpet production occurs in households on independent looms provided by carpet exporting companies. Because factory-style manufacturing is not in accordance with Afghan traditions, only a small portion of total production can be done in factories. However, nowadays, an increasing number of investors are heading toward building factories (McCord, 2007).

Afghan carpet producers have serious problems in expanding into the world market. Direct relationships of producers and sellers with the markets are weak. Generally, either buyers or traders contact the weavers or they buy the carpet before the “finishing” stage and supply it to the world market. Afghanistan’s capacity is insufficient in the “finishing” stage, which is accepted as an important stage of carpet production and consists of cutting and washing. Afghanistan’s logistics infrastructure is also inadequate. As a result, more than 80% of Afghan carpets are transported to Pakistan via trucks for the “finishing” stage and logistics; they are collected there and exported to the world market under Pakistani brands. This situation decreases the efficiency and recognition of Afghan carpet exports to the world market (McCord, 2007).

Despite its shrinkage in the world market, between 2000 and 2005, the Afghan carpet industry grew by 2% on average. According to the estimates of the Afghanistan Export Promotion Agency, 2 million carpets are exported per annum. Pakistan is one of the prominent handmade carpet exporting countries of the world, but more than 70% of the carpets that are sold as Pakistani carpets are actually Afghan carpets (AISA, 2007). Exports were realized as 123 million USD in 2000, 154 million USD in 2001, 136 million USD in 2003, 149 million USD in 2004, and 140 million USD in 2005 (USAID, 2006). It is observed that Afghanistan has increased its handmade carpet exports in recent years. According to data of International Trade Center (Trade Map, Trade Statistics for International Business Development, <http://www.trademap.org>), the value of exports in 2008 was 240 million USD.

According to the estimates of the OTF Group, if Afghanistan is able to increase its production capacity and develop finishing facilities, it could increase carpet exports rapidly. According to a study of the US Agency for International Development, under the assumption that Afghanistan carpet exports grow by 11% per annum, exports can reach up to 350 million USD in 2015 (Kurata, 2007). Moreover, it is targeted that 80% of Afghan carpets could be finished in Afghanistan and exported to the world market (USAID, 2006).

The Afghan government has realized the importance of the carpet industry and supports it, together with the non-governmental organizations and international organizations (AISA, 2005). In fact, since 2001, both the Afghan government and international organizations have been trying to lead Afghan carpets to important positions in the world market. In spite of such efforts, insufficient technology, infrastructure, difficulty in accessing capital, security problems and the inability to reach markets have prevented Afghan carpets from becoming exceptionally prominent in the world market (USAID, 2005).

Pakistani carpet industry

The carpet industry has a vital role in the economy of Pakistan and provides many job opportunities, especially for people in rural areas. According to the Pakistan Carpet Manufacturers and Exporters Association (PCMEA),⁴ there are 150,000–200,000 looms in the country and the number of weavers is estimated around 200,000–250,000 (Cameron & Khair-uz-zaman, 2006). Moreover, more than 1.5 million people are employed in this industry and more than 3 million people directly or indirectly depend on its earnings. The handmade carpet industry constitutes 0.64% of the total GDP, 3.66% of the manufacturing industry GDP, and approximately 14% of the small-scale manufacturing sector GDP (Nasir, 2004).

The unique characteristics of the Pakistan carpet industry are the high quality and low price of the carpets produced. The patterns and designs of carpets and rugs made in Pakistan incorporate local, Persian, and Turkish designs. This blend creates a design that is unique to Pakistani carpets. Although a large variety of carpets are produced, the main two types of Bokhara and Persian dominate the market (Nasir, 2004).

Pakistan is one of the world’s largest carpet exporters. More than 99% of carpets woven in the country are exported; local consumption is negligible (Cameron & Khair-uz-zaman, 2006). As mentioned above, most Afghan carpets are transported to Pakistan for the finishing stage and are then exported to the world market as Pakistani carpets. It is mentioned that over 70% of these “Pakistani” carpets are in fact Afghan.⁵

Pakistan produces and exports both handmade and machine-made carpets; however, the proportion of machine-made carpets is very low. Pakistan realized a decrease in the export of handmade carpets from 2005 to 2008. The value of exports was 284 million USD in 2005, but it declined to 186 million USD in 2008. Carpet and rugs exports accounted for 1.56, 1.37, and 1.14 of the total exports in 2005–2006, 2006–2007, and 2007–2008, respectively. However, this value equaled an average of 2.7 for the 1994–2002 period. Obviously, carpet exports, as a proportion of total exports, have declined in Pakistan (Trade Development Authority of Pakistan, n.d.⁶). The main reason for this dramatic decline is the start of the export of some Afghan handmade carpets over Afghanistan instead of over Pakistan in the last few years. Major markets for the Pakistan carpet industry in 2007–2008 were Germany, France, Turkey, South Africa, and Canada (Trade Development Authority of Pakistan, n.d.). When we compare these data to the major markets in 2002–2003, namely the United States, Germany, Italy, UK, and France, a change in buyers is observed (Cameron & Khair-uz-zaman, 2006).

Nepalese carpet industry

Nepalese carpets are made of the highest quality fleece wool, which is imported from Tibet, New Zealand, and Britain.⁷ Nepalese handmade woollen carpets are major export products of unique qualities, such as texture, color combinations, resiliency, strength, and durability. Around 95% of Nepalese carpet production is concentrated in the Kathmandu valley. The Nepalese carpet industry is very important to the Nepalese economy. It is one of the highest employment generator industries in the country, especially for the rural people.

Woolen carpet exports constituted 32% of total exports exported to all countries other than India in the 2006–2007 fiscal year. However, in 2007–2008, this rate decreased to 23%. The values of woolen carpet exports to the all countries except India were 5838.7, 5600.2, and 5048.2 million rupees in 2005–2006, 2006–2007, and 2007–2008, respectively. The annual manufacturing index for woolen carpets (the fiscal year 2003–2004 is 100) was 106.9 in 2005–2006, 96.6 in 2006–2007, and 90.2 in 2007–2008. It is apparent that the manufacturing of woolen carpets has declined in the most recent years. Also, the volume of carpet exports peaked in the 1990s, but after 2000, the export volume (measured in square meters) declined (Chakrabarty, 2006).

Nepalese carpets have been exported to more than 40 countries and the leading export markets are Germany, the United States, Belgium, Britain, Turkey, Switzerland, Japan, Spain, Canada, and Italy. The United States and Germany are the two largest export

markets, with Germany's share being more than 45% of the total carpet export market.

In the past, Nepal has faced problems regarding the use of illegal child labor and to overcome this problem, the Nepal RUGMARK Foundation⁸ was established in 1995. Also, the Central Carpet Industries Association was established in July 1990 as a result of the need for coordinating policies and activities between the government and the carpet industry (<http://nepalcarpet.org/index.php?page=about>).

Several studies prove that Nepal has revealed comparative advantage on carpets over various products. Despite this importance, the carpet industry, which is a mainstay of the Nepalese manufacturing industry, has lost over half of its market in recent years due to decrease in demand, implemented price controls, long order cycles, and increased competition (Pant & Panta, 2009).

Empirical analysis of “handmade carpet” in the US market

In this section, we examine the revealed comparative advantage (RCA) index, the Kreinin–Finger similarity (KFS) index, and the export determinants of “handmade carpet”⁹ in the US market using a gravity model.¹⁰ Export data of “handmade carpet” spanning from 1989 to 2008, involving Turkey and her five main competitors¹¹ in the US market, was collected. The RCA index provides guidance to examine whether Turkey possesses a comparative advantage in the US market over her trade competitors.

Revealed comparative advantage (RCA) index

The RCA index is calculated as the percentage share of a country's exports of “handmade carpet” divided by the share of the world exports of “handmade carpet”. If the index takes a value greater than unity, then the country is said to have revealed comparative advantage in the commodity. The calculated figure measures the relative importance of a country's export of “handmade carpet” as compared with that for the world as a whole. If the calculated RCA is greater than unity, it implies that the country's exports are moving closer to the pattern of the world exports of that particular commodity.

Figure 1 summarizes the RCA index for Turkey and her main competitors for “handmade carpet” (SITC 6593). As observed from the figure, RCA values of all countries are lower than unity, which means that these countries do not have an RCA in handmade carpets. Turkey maintained high RCA over other countries before 1997, but this advantage disappeared eventually. Since 1992, as a result of the both domestic and international

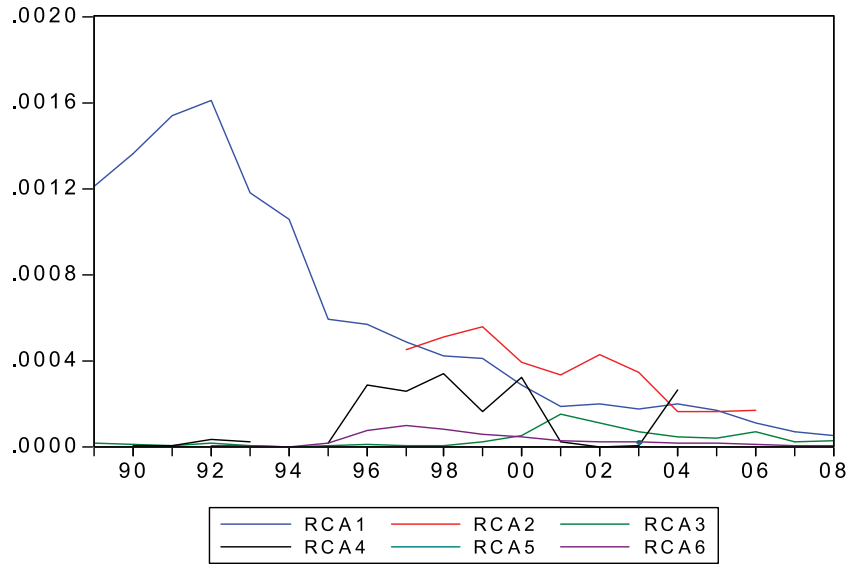


Figure 1. Revealed comparative advantage index (1989–2008). Source: Authors’ estimates based on data from the UN Commodity Trade Statistics database (UN Comtrade). $RCA_{ij} = x_{ij}/X_{wj}$, where x_{ij} is the share of commodity j in country i ’s exports of “handmade carpet”, and X_{wj} is the share of commodity j in the world total exports of “handmade carpets”. Turkey, Iran, India, Pakistan, Nepal, and China are denoted by number 1, 2, 3, 4, 5, and 6, respectively.

problems and difficulties in the handmade carpet industry, Turkey is experiencing a sharp decline in its RCA. Turkey is supposed to make a crucial decision about the future of its handmade carpet production. The RCA of Iran declined from 1997 to 2006, but still Iran manages to keep its RCA over Turkey. Contrary to Turkey, the Iranian government has prepared several reforms to cope with the declining RCA. Although these two countries are experiencing decline in RCA for many years, the other countries mostly stayed under these two countries in terms of RCA values.

Kreinin–Finger similarity (KFS) index

We use the KFS index presented by Finger and Kreinin (1979) as a mean to measure the degree of export similarity of “handmade carpet” in the US market. The index is defined as the sum of the smaller value for which:

$$KFS = \sum_j \text{MIN}(x_{j1}, x_{j2}) \tag{1}$$

where x is the share of a commodity in exports, j is the product, and 1 and 2 are the two countries for which the index is being calculated.

The value of the index ranges from 0, where there is no overlap between the products the two countries export, to 1, when they have identical export structures. We use Turkey as the benchmark country for the purpose of comparison. Figure 2 presents the results, and we can observe that Iran and Pakistan have most similar export

structure in terms of “handmade carpet” in the early 1990s. However, this pattern was later on replaced by India and Nepal eventually. And after 2004, Pakistan also followed a similar export structure with India and Nepal. As a result of the strategies implemented by the PCMEA, Indian Carpet Export Promotion Council, and Nepalese Central Carpet Industries Association, these countries have increased their effectiveness in the handmade carpet industry and have become the important competitors of Turkey in the United States and in the world handmade carpet market.

Determinants of export performance

Model specification

The import demand function of “handmade carpet” imported from Turkey and her main competitors to the US market is specified using the following equation:

$$IM_{i,t} = Y_{i,t}^{\beta_1} y_{i,t}^{\beta_2} Y_{c,t}^{\beta_3} y_{c,t}^{\beta_4} E_{i,t}^{\beta_5} D_{i,t}^{\beta_6} OPEN_{i,t}^{\beta_7} YD_{i,t}^{\beta_8} P_{i,t}^{\beta_9} KFS_{i,t}^{\beta_{10}} \tag{2}$$

where i represents the exporting country ($i = 1, \dots, 6$);¹² t ($t = 1, \dots, 19$), starting from year 1989, represents the time at which transaction takes place; c denotes US variables; IM_{it} represents the US dollar value of “handmade carpet” exported from country i to the US market; Y is GDP; y is per capita GDP; E is the real exchange rate as per the unit of foreign currency; D is the

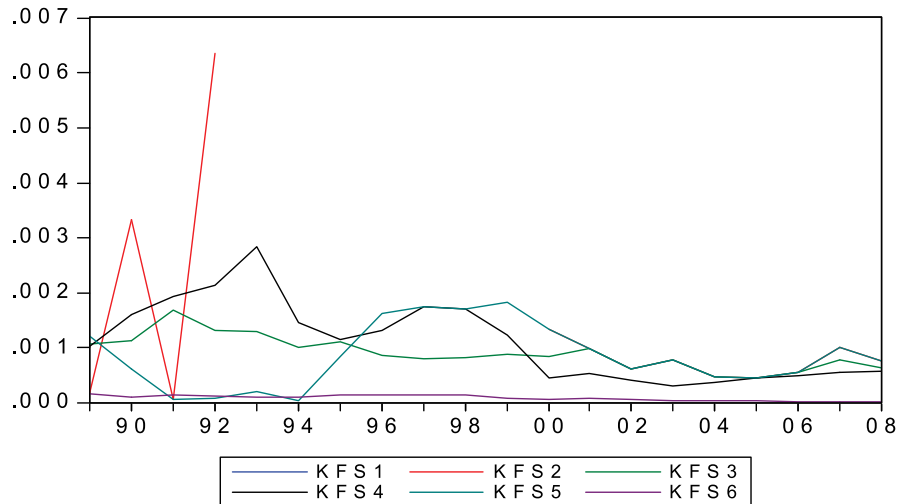


Figure 2. Kreinin–Finger similarity index (1989–2008). Source: Authors’ estimates based on data from the UN Commodity Trade Statistics database (UN Comtrade).

geographical distance (in km) between the capital of country i and New York City of the US.

The focus of our study is on the determinants of “handmade carpet” exported from country i to the US market during 1989–2008. Some main determinants of IM_{it} are under our consideration. Firstly, textile industry is labor-intensive, so we expect that IM_{it} is negatively correlated with exporting country’s per capita GDP (y_{it}), whereas we use y_i as a proxy for China’s capital intensity. The economic rationale is that a country tends to export fewer carpets when the country becomes relatively more capital abundant. In the same fashion, we expect that IM_{it} and y_{ct} exhibit positive relation because importing countries that are more relatively abundant in capital are supposed to import more labor-intensive products such as carpets.

Secondly, we use exporting country’s GDP (Y_{it}) as a proxy for carpet supply and expect that it is positively correlated with IM_{it} .

Thirdly, we expect that the wealth of the importing country is positively correlated with its imports. We use importer’s GDP (Y_{ct}) as proxy for its wealth and expect that IM_{it} and Y_{ct} are positively correlated.

Fourthly, we expect the real exchange rate as per the unit of foreign currency has a negative impact on country’s exports so that IM_{it} and E_{it} are negatively correlated. Lastly, we normally expect that geographical distance has a negative impact on exports; however, we would like to argue that such an effect may not be significant in our case because sourcing markets are rather diverged in this industry and hence distance may not play a significant role on carpet exports.

Other control variables include the following:

- (1) Openness (i.e. total trade/GDP) ($OPEN$): this variable indicates the degree of free trade of a country. We expect a positive sign for this variable because the more open the country is, the more trade opportunities take place.
- (2) Real exchange rate (foreign currency/USD) (RER): we expect a positive sign for this variable because US dollar appreciation will induce more imports, holding other things constant.
- (3) Per capita differential (US GDP – GDP of exporting countries) (YD): this factor represents the degree of factor endowment differential between two countries. The coefficient of this variable could be positive or negative. The reason for this ambiguity is that β_8 would be positive if Heckscher–Ohlin hypothesis¹³ holds and negative if the Linder hypothesis holds.¹⁴ The former hypothesis proposed that international trade pattern would be determined by the relative factor endowments of different nations, while the latter hypothesized that nations with similar demands would develop similar industries and consumption goods for exchange.
- (4) Unit price (USD/KG) (P): according to the law of demand, higher the price or opportunity cost of importing the goods, lesser will the consumer be willing to buy. Therefore, we expect a negative sign associated with this variable.
- (5) KFS index (KFS): we expect a positive sign because the more concentrated is an exporting country on a product, the higher will be the import volume of that product.

All variables in Equation (1) are expressed in logarithmic form, except real exchange rate, and we construct a fixed-effect model as follows:

$$\ln X_{i,t} = \beta_0 + \beta_1 \ln Y_{i,t} + \beta_2 \ln y_{i,t} + \beta_3 \ln Y_{c,t} + \beta_4 \ln y_{c,t} + \beta_5 E_{i,t} + \beta_6 \ln D_i + \beta_7 OPEN + \beta_8 YD + \beta_9 P + \beta_{10} KFS + \alpha_i + \varepsilon_{i,t} \quad (3)$$

where α_i captures all unobserved time-constant factors that affect X_{it} , where X_{it} is the natural log of the US dollar value of “handmade carpet” exported from country i to the US market. α_i is called unobserved effect or simply fixed effect and it does not change over time. Geographical features, such as the country’s location, can be included in α_i . Many other factors may not be exactly constant, but might be roughly constant in the short run. The model is called the fixed-effect model. ε_{it} is the idiosyncratic error or time-varying error because it represents unobserved factors that change over time and affect X_{it} .

Empirical findings

One possibility to obtain estimates is to just pool the 19 years of data and use the ordinary least squares (OLS) technique. However, this method has three drawbacks. Firstly, it assumes that the effect of each explanatory variable has remained constant over time. Secondly, there may be heteroskedasticity in the error term underlying the estimated equation. Thirdly, in order for pooled OLS to produce a consistent estimator, we would have to assume that the unobserved fixed effect, α_i , is uncorrelated with explanatory variables. However, if α_i is correlated with the explanatory variables, OLS will be biased, since α_i is part of the error term. The fixed-effects estimator is an estimator which, like first differencing, uses a transformation to remove the unobserved effect α_i prior to the estimation. Any time-constant explanatory variables are removed along with α_i .

Some more advantages for the panel data model are that with panel data, we can control for factors that vary across countries but do not vary over time. We can also control for those factors that could cause omitted variable bias if they are omitted in pooled OLS estimation. Moreover, since α_i is unobserved or unmeasured, therefore it cannot be included in the regression using multiple regression. Essentially, we need to determine between fixed and random effect by running a Hausman specification test as suggested by J.A. Hausman (1978). Normally, fixed effect is reasonable in dealing with panel data because it always gives consistent results; however, random effect is a more efficient estimator, so we should run random effects if it is statistically justifiable to do so. The Hausman test checks a more

efficient model against a less efficient but consistent model to make sure that the more efficient model also gives consistent results. The Hausman test examines the null hypothesis that the efficient random-effects estimator estimated the same coefficients as done by the consistent fixed-effects estimator. The Chi-square statistics of the Hausman test is 39.11, which is significant at the 1% level, suggesting that fixed-effect modeling is appropriate.

Table 5 shows that all variables are significant at 5% level, except for the proxy for openness, which is marginally significant ($p = 0.126$). The results suggest that imports will increase by 2.94%, as induced by a 10% increase in exporter’s GDP. It also shows that imports will decrease by 3.04%, as induced by a 10% increase in exporter’s per capita GDP. Moreover, a 10% increase in US per capita GDP will lead to 13.48% increase in import volume. However, this effect was cancelled out by a 6.4% decrease in exports due to a 10% increase in US GDP, implying that carpet is an inferior good in the United States.

The findings also suggest that whenever there is a 10% real depreciation/appreciation of US dollar against foreign currency, there is a 0.2% decrease/increase in imports. This finding suggests relatively low exchange rate import pass-through in carpet commodity. In addition, β_8 is negative, which supports the Linder hypothesis that countries with similar preferences and demand structures will tend to trade more. We also estimate a pooled regression model, which confirms a negative coefficient related to distance.

Conclusion

In Turkey, which has been known for many years as a “carpet country,” handmade carpet manufacturing has

Table 5. Panel data estimation results on carpet import (1989–2004).

Dependent variable: $\ln IM$	Coefficient	t -Stat.	p -value
Explanatory variables			
US GDP	-0.644	-3.066	0.003
US per capita GDP	1.348	3.313	0.002
Exporter’s GDP	0.294	3.492	0.001
Exporter’s per capita GDP	-0.304	-3.493	0.001
Real exchange rate	0.022	3.848	0.000
<i>OPEN</i>	0.000	-1.552	0.126
GDP per capita differential	-0.624	-3.381	0.001
Unit price	-0.277	-2.130	0.038
<i>KFS</i>	0.013	23.066	0.000
Constant	1.268	2.614	0.012
R^2	0.887		
D - W . Stat.	1.802		

been in a serious recession in the last decade. In the past, Turkey had an important position in the world handmade carpet market. Although Turkey has knowledge and a thriving culture in handmade carpet production that has been carried throughout its history, the Turkish handmade carpet and rug industry is undergoing a rough period. The main reason for its difficulties and problems is the cheap labor-based competitiveness of Far East countries, primarily China, India, Pakistan, and Nepal. Since labor as well as other costs is lower in these countries than they are in Turkey, Turkish handmade carpet production is losing its competitive power both in the domestic market and in the world market.

Additionally, rapid changes in the consumer preferences in this market, with design, models, and colors becoming more prominent, have caused Turkish handmade carpet industry to enter into a dreary period. As the RCA index for Turkey indicates, Turkey's RCA has been declining since 1992. However, despite this decline, the RCA of Turkey was above that of other countries until 1997. But after this, the advantage disappeared eventually and was gained by Iran.

Turkey's per capita GDP was 2.941 USD in 2002 and rose to 5.477 USD in 2006, with an increase of 86%. In addition to the increase in the per capita GDP, the implementation of 8 years of mandatory education in 1997 became an important problem for the industry. The increase in income and education levels in recent years has resulted in a decrease in the supply of weavers. Another important factor in the exports of Turkey is the overvalued Turkish Lira against USD. As indicated by the panel data estimation, the depreciation of US dollar against Turkish Lira has had a negative effect on the handmade carpet exports of Turkey.

As a consequence of these problems and difficulties, Turkey has lost its competitive advantage. Therefore, Turkey's handmade carpet exports are gradually declining and its handmade carpet imports are continuously increasing. Furthermore, in Turkey, handmade carpet and rug production is in a serious recession. The number of firms producing at high volumes has decreased substantially. This industry, which created employment for women and became a source of extra income for families for many years in rural areas, especially in mountain villages, has seen a great decline in employment, and interest in weaving has dropped off.

If the current trend continues, handmade carpet and rug production in Turkey might cease as something of industrial magnitude, and production would continue only with cultural and artistic concerns. It could be expected, however, that, with the handmade carpet and rug trade, the importation of carpets from Far East countries will continue in the future.

For further studies, as the data about the handmade carpet industry is highly limited, a semi-structured

survey of the manufacturers in the handmade carpet sector can be performed to better understand the current situation in the Turkish handmade carpet industry. We believe that in this way, important policy implications in terms of fostering the handmade carpet exports can be achieved. Also, a survey of the consumers of handmade carpets in the US market can be conducted. Hence, the determinants of handmade carpet such as design, color, and brand can also be analyzed.

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Notes

1. In this paper, the sections on Turkey, Iran, India, China, and Afghanistan have been prepared based on a report written in 2008 in Turkish for the Istanbul Chamber of Commerce (see Bilgin and Demir (2008)).
2. Data is compiled from ITKIB reports.
3. The information on Indian carpet industry was collected to a large extent from the website of Indian Carpet Export Promotion Council (<http://www.india-carpets.com>).
4. The PCMEA provides guidance to its members on issues related to manufacturing and exporting (<http://www.pcmea.com.pk>).
5. <http://www.aisa.org.af>
6. Trade Development Authority of Pakistan develops projects for value-added exports and implements marketing consultant for the carpet sector to establish and strengthen the marketing of carpets to create a successful image and to achieve long-term competitiveness in the world market.
7. The information about the Nepalese carpet industry was collected, to a large extent, from the website of Trade and Export Promotion Centre of Nepal (<http://www.tepc.gov.np>) and the Nepal Rastra Bank (<http://www.nrb.org.np>).
8. <http://www.nepalrugmark.org/about.php>
9. The definition given by the United Nations Statistics Division Classification Registry using the Standard International Trade Classification, Revision 3 (SITC, Rev. 3). The SITC code that defined "textile floor coverings, kelem, schumacks, karamanie, and similar handwoven rugs" is 6593.
10. The issues of bilateral trade flows and trade elasticity are examined widely in the literature (see, e.g. Bergstrand, 1985, 1989; Carrillo and Li, 2002; Christie, 2002; Egger and Pfaffermayr, 2003; Mátyás, Konya, and Harris, 2000; Mathur, 1999; Sharma and Chua, 2000).
11. Main competitors including Iran, Pakistan, India, Nepal, and China. However, due to data constraint, we did not include Afghanistan in the empirical analysis.
12. Turkey, Iran, India, Pakistan, Nepal, and China are denoted by number 1, 2, 3, 4, 5, and 6, respectively.
13. The Heckscher–Ohlin theorem predicts that a capital-abundant country will export the capital-intensive good, while the labor-abundant country will export the labor-intensive good. This implies that a country will import more from another country if the factor endowment in her

trading partner is very dissimilar as compared with the importing country, the United States in our case.

14. This hypothesis assumes that consumer preferences and demand structures are closer if the per capita GDP is also closer between these two nations.

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