

Free Trade and Factor Proportions in the GCC

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Abstract

The present paper applies concepts from factor proportions trade theory to predict the direction and content of free trade between countries in the Gulf Cooperation Council. Differences in labor skill intensity and abundance as well as differences in capital abundance between Kuwait and the United Arab Emirates suggest trade potential between two groups of economies in the GCC, traditional and modern. The pending income redistribution is discussed.

Free Trade and Factor Proportions in the GCC

The present paper uses concepts from factor proportions trade theory to predict trade potential in the Gulf Cooperation Council (GCC). The GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) are negotiating a free trade agreement stimulated by increasing young workers and structural reform to reduce their public sectors. Questions remain, however, about the potential of free trade between seemingly similar economies.

Trade in factor proportions theory is based on countries exporting products that use their abundant factors intensively. The present paper examines the labor abundance and intensity in Kuwait and the UAE for six skill groups of labor across four major sectors. There is no similar data for the other GCC countries but these two characterize the modern and traditional economies of the GCC.

An empirical difficulty with numerous factors and products is that factor intensity is defined for only two factors or two products. The present paper applies a distance intensity measure that provides a unique ranking for each country, and compares capital abundance and intensity relative to aggregate labor. The potential for GCC trade and the income redistribution are discussed.

Background on the UAE and Kuwait

The UAE has managed to diversify its economy with outward looking development moving it from the most oil dependant GCC country (90% of GDP in 1980) to the least (50% in 2004). The federal UAE government allows individual emirates to develop specializations, namely energy and petrochemicals in Abu Dhabi, tourism and services in Dubai, light manufacturing in Sharjah, and heavy industry in Ras Al-Khaimah. The UAE has the lowest tariffs in the GCC at 8% compared to the average 19% and there are free trade zones such as Jebel Ali. The common GCC tariff of 5% would be eliminated with a free trade agreement. Exports have evolved from oil, petrochemicals, fertilizers, cement, and aluminum to include electronics, light manufacturing, machinery, and transport equipment.

The UAE has developed banking and tourism although other services such as telecommunications and insurance remain less developed and closed to foreign investment and competition.

Kuwait has experienced low investment and slow economic growth since the 1990 Iraqi invasion. Reconstruction has made the country more dependent on expatriate labor, a major political issue. The lack of investment has led to a less diversified economy than the modern economies of the UAE, Qatar, and Bahrain. The GDP share of oil rose to 76% in 2002 and public sector growth has created employment for young Kuwaitis. Recent repatriation of Arab investment and higher oil prices may make some difference for the future.

Qatar and Bahrain are similar in terms of economic development to the UAE while Saudi Arabia and Oman are similar to Kuwait. One indication is the index of foreign direct investment in Table 1 (IMF, 2005 with Bahrain, Qatar, and the UAE attracting the most FDI during 2000-2002. Their lower shares of government consumption in GDP may also indicate a more modern economy. The present paper looks for evidence of potential factor proportions trade between Kuwait and the UAE, extending the results to these two GCC groups.

Insert Table 1

Factor Intensity and Abundance

The present labor data has 6 skill groups (managers, professional & technical, clerks, sales & service, agricultural, operators & crafts) employed across 4 major sectors (manufacturing, services, agriculture, mining). Samuelson (1953) defines factor intensity for two factors and two products with product 1 using factor 1 intensively if $a_{11}/a_{21} > a_{12}/a_{22}$ where a_{ij} is the cost minimizing input of factor i in product j . The ranking expands to include any number of products and the parallel ranking $a_{11}/a_{12} > a_{21}/a_{22}$ expands to any number of goods.

Factor proportions theory with many factors and many products has been developed by Chipman (1966), Ethier (1984), Chang (1979), and Thompson (1985). Ruffin (1981) develops the model with

three factors and two products. Barycentric triangles provide a measure of factor intensity in the 3x3 model of Leamer (1987) and Jones and Margit (1991).

The present model illustrates the potential usefulness of the factor intensity distance of Thompson (2003). Consider the Euclidean distance from the unit value of a factor to the intensity hyperplane of a product, derived as the intersection of intensity rays with the unit line $a_{ij} = 1$. The distance from $a_{ij} = 1$ to the ray for product j is a_{2j}/a_{1j} and good 1 uses factor 1 intensively if the distance from the point $a_{11} = 1$ to the ray for good 1 is smaller, $a_{21}/a_{11} < a_{22}/a_{12}$. For any number of factors, the Euclidean distance to the intensity hyperplane relative to factor 1 is given by,

$$d_{1j} = \left((a_{2j}/a_{1j})^2 + \dots + (a_{rj}/a_{1j})^2 \right)^{1/2} \quad (1)$$

The factor intensity distance for factor h in product j is

$$d_{hj} = \left(\sum_{i \neq h} (a_{ij}/a_{hj})^2 \right)^{1/2}. \quad (2)$$

Factor intensity distance generalizes the concept of factor intensity to any number of factors and goods. Good m uses factor h intensively relative to good n if $d_{hm} < d_{hn}$.

For each factor, goods can be ranked by factor intensity distance. To eliminate the issue of different units for labor and capital, inputs are weighted by their averages across industries. The weight of the a_{ij} across industries is $\alpha_{ij} = a_{ij}/\mu_i$ where $\mu_i = \sum_j a_{ij}/n$ and n is the number of goods, resulting in the ratios $\alpha_{ij}/\alpha_{hj} = (a_{ij}/a_{hj})(\sum_j a_{hj}/a_{ij})$. The α_{ij} have no units thus their ratios can be added.

Factor abundance with 2 countries and 2 factors is the ratio $v_{11}/v_{21} > v_{12}/v_{22}$ where v_{ki} is the amount of factor i in country k . With free trade, countries with identical homothetic utility would consume products in the same ratio and export the product using their abundant factor intensively. Vanek (1968) extends the factor content theorem to any number of factors and Kang, Malki, Rassekh, and Thompson (2005) apply the distance measure to factor abundance with many countries.

In the present model with six factors and four products, there are no necessary links between abundance, intensity, and trade even with universal, identical, homothetic, constant returns production functions as developed by Ethier (1984). As an example, Thompson (1985) uncovers 7 comparative static sign patterns of endowments differences on outputs in the model with only three factors and two goods. Nevertheless, the concepts of factor abundance and intensity may prove useful.

The goal of the present paper is to compare factor abundance and intensity for the UAE and Kuwait projecting the comparison to the modern and traditional economies of the GCC. While there are apparent similarities between the UAE and Kuwait (oil reliance, weather, expatriate labor, and legal systems) differences in factor abundance and intensity suggest potential gains from trade.

Labor Skill Abundance and Intensity

Table 2 and Figures 1 and 2 show distance labor intensity across the 4 major sectors and 6 labor skill groups for Kuwait and the UAE. Intensity measures are inverted and rescaled to range from a maximum of 100 to a minimum of 0. Mining excludes oil and is mainly lime and clay to form clinker for cement production. The excluded oil sector will have little impact on intra GCC trade but oil by-products are included in manufacturing.

Insert Table 2

Insert Figure 1 and Figure 2

There are differences between the two countries in skill labor intensity. Operators are the most intensive labor in Kuwaiti manufacturing at 19 while the corresponding UAE intensity is 100 (cropped to 80 in Figure 2). Operators are the most intensive input in Kuwaiti agriculture at 100 (cropped to 80 in Figure 1) while in the UAE agricultural workers are the most intensive, suggesting Kuwait is more involved in processing. The UAE manufacturing and mining sectors are more intensive in professionals and operators than Kuwait, suggesting trade potential for these sectors. Production processes in the two economies are unrelated with an intensity correlation of 0.03.

Figure 3 shows the labor skill abundance with the UAE most abundant in agricultural labor and operators relative to Kuwait. Kuwait is most abundant in clerks and sales labor, with managers and professionals in some abundance. The suggestion is that the UAE would export products intensive in agricultural labor and operators (agricultural products and manufactures) although the potential of agricultural trade must be limited. Kuwait would export mining and services but some manufactured products given the intermediate abundance of managers and professionals.

Insert Figure 3

Skill wages will be affected by trade and the magnification effect of Jones (1965) implies wages would fall or rise in percentage terms by more than price changes. Suppose prices change by the common GCC tariff of $\pm 5\%$. Prices of projected exports would rise in each country, mining and services by 5% in Kuwait and agricultural products and manufactures by 5% in the UAE, and prices of imports would fall correspondingly. Wages of agricultural workers and operators in the UAE would rise by more than 5% while wages of clerks and sales would fall by more than 5%. In Kuwait, wages of agricultural workers and operators would fall and wages of sales and professionals would rise by more than 5%. These are substantial changes in relative wages, over 10% between skill groups.

Capital Abundance and Intensity

Capital abundance and intensity relative to aggregate labor can be derived from national income data assuming capital is the only other input. The UAE is much more capital abundant with a capital/labor ratio 1.66, over three times Kuwait at 0.54. The war and lack of investment during the 1990s has contributed to the Kuwaiti capital scarcity. The prediction is that the UAE would export capital intensive products and Kuwait would export labor intensive products although the politics of expatriate labor could hinder production.

Figure 4 reports capital/labor intensities across the 4 major sectors and they are unrelated with a correlation of 0.02. Kuwaiti services and manufactures are labor intensive while UAE mining and manufactures are capital intensive. The prediction from the capital/labor factor proportions model is that relatively labor abundant Kuwait would export labor intensive services while the capital abundant UAE would export capital intensive mining. There would be intra-manufactures trade with Kuwait exporting labor intensive products in exchange for capital intensive products from the UAE.

Insert Figure 4

Conclusion

Factor abundance and intensity are unrelated between Kuwait and the UAE, and by extension between traditional and modern economies in the GCC. Increased trade between the modern (UAE, Bahrain, Qatar) and traditional economies (Kuwait, Oman, Saudi Arabia) is anticipated by factor proportions theory. Although GCC trade will generate overall gains, output changes and income redistribution will generate losers as well as winners. Winning export industries in the modern economies will be manufacturing and agriculture, with mining and service exports winning in the traditional ones. There will be winning and losing industries in manufacturing in every country.

Labor income will be redistributed with GCC trade. Across skill groups, scarce agricultural workers and operators in the traditional economies will lose while scarce clerks and sales workers in the modern economies lose. Relative to capital, scarce aggregate labor will lose in the modern economies but gain in the traditional economies.

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Table 1. Modern versus Traditional GCC Countries

	FDI	G/GDP
Modern		
Bahrain	9.1	.20
Qatar	7.5	.18
UAE	2.4	.15
Traditional		
Oman	0.1	.22
Kuwait	-0.4	.26
Saudi Arabia	-1.5	.25

Table 2. Labor Intensities

Kuwait	UAE	Manufacturing		Services		Agriculture		Mining	
Managers		0.4	1.1	1.7	2.4	0	0.2	0.5	1.5
Professional		2.1	6.3	6.9	9.5	0	1.8	11.7	27.6
Clerks		1.3	1.5	5.4	3.2	0	1.1	3.0	2.8
Sales		4.7	1.3	14.4	13.1	0	0.6	3.7	1.0
Agricultural		0.01	0.2	0	0.04	3.7	74.4	0	0.03
Operators		30.6	100	0	20.1	100	9.7	7.9	24.8



