

Journal of Economic Cooperation & Development

M. Moniruzzaman

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EDITORIAL NOTE

Five papers make up this issue. The first one, titled **The Rise of China and Its Implications for the Muslim World** by *M. Moniruzzaman*, attempts to assess probable implications of China's rise for the Muslim world. It argues that two particular factors namely, geographical proximity between China and many of the oil-rich Muslim countries, and strain relationship between the West and the Muslim world since the end of the Cold War are likely to make China and the Muslim world foster closer economic and strategic relations making the latter a direct beneficiary of a rising China. The Muslim world is a common term used in this paper to include 47 Muslim majority countries in the world.

The second paper, titled **Role of Geopolitics in Import Shares of Leading Trade Partners in GCC Import Markets** by *Nader Habibi*, focuses on how the market shares of leading exporters in the GCC (Gulf Cooperation Council) countries have been impacted by major geopolitical events. The SUR regression model is used to investigate the impact of important events on relative markets. The main hypothesis is that GCC imports from the US are sensitive to the US involvement in the Arab-Israeli conflict and US military interventions in the Middle East. To investigate this theory, four important geopolitical events are considered: Gulf War I (1991), Second Palestinian Intifada (2000-2001), The September 11 terror attacks (2001) and the US invasion of Iraq (2003-2004). The statistical results suggest an association between both, the Gulf War I and the US invasion of Iraq, and changes in US market share in GCC imports. We observe a positive association between Gulf War I and the US market share in the aggregate imports of the GCC countries. On the other hand, the statistical results suggest a negative association between the invasion of Iraq and the US market share in aggregate imports of the GCC occurs. Among GCC countries, this negative association is only significant for the US market share in Saudi Arabia. Finally, the results for the second intifada /September 11th attacks are mixed.

The third paper, titled **Efficiency of Islamic Banks: A Comparative Analysis of MENA and Asian Countries** by *Romzie Rosman* and *Abdul Rahim Abdul Rahman*, examines and compares the efficiency of selected Islamic banks in Middle Eastern and North African (MENA) countries (including Gulf Cooperation Countries) and Asian countries. The efficiency scores were measured using data envelopment analysis based on the intermediation approach. The sample was comprised of 63 Islamic banks, focusing on performance for a four year period (2006 to 2009). The study finds that the main source of technical inefficiency among the Islamic

banks is the scale of their operations. The Islamic banks, in general, achieved a high score for pure technical efficiency, indicating that the banks' management were able to efficiently control costs and use the inputs to maximise the outputs regardless of scale effects. On average, Islamic banks from Asian countries are found to be relatively more efficient than those in MENA countries. Interestingly, most of the efficient Islamic banks were from Gulf Cooperation Countries. The economic condition of a country is found to be the main determinant of an Islamic bank's efficiency.

The fourth paper, titled **A Study of the Competitiveness of Iran's Banking System** by *Reza Najarzadeh, Michael Reed and Hadi Mirzanejad*, employed the Panzar and Rosse approach to assess the level of competition in the Iranian banking system during 1997-2010. Panel data is used for all the 18 banks (private and public) that have been commercially active for at least the last four years. The results show that during the period of the study the banking system has been operating under a monopolistic competition system. It is also shown that allowing competition among private banks has improved the competitive environment. Finally, the results indicate that with private banks entering the market, competition in the entire banking system has risen.

The last and fifth paper, titled **Did Financial Market Integration Really Happen in MENA Region? – An Analysis** by *Ohannes G. Paskelian, Chu V. Nguyen and Kevin Jones*, examines the characteristics and behavior of stock market equity indices of several Middle East and North Africa (MENA) countries. It also explores the cointegrating behavior of the MENA stock markets with the United States equity markets. Granger causality tests based on the VECM reveal strong bidirectional causalities between several of the MENA stock markets. The Granger causalities also indicate that stock market returns of Egypt, Jordan, Kuwait, Malta, Oman, Qatar, Saudi Arabia and Tunisia exhibit cointegrating behavior. The results reveal significant weak exogeneity from the United States stock markets to all the MENA stock markets. The findings suggest that while MENA stock markets tend to co-move with the U.S. stock market. Furthermore, markets within the MENA region are not yet fully integrated with the U.S. However, market imperfections may preclude U.S. investors from entering MENA markets to take advantage of possible diversification benefits. The increased level of integration of markets within the MENA region does not necessarily reduce the potential of risk diversification for international portfolios.

The Rise of China and Its Implications for the Muslim World

M. Moniruzzaman, *PhD*¹

The contemporary economic rise of China is likely to affect the international politics and political economy in many ways. China's growth is multidimensional ranging from economic, military, education, scientific and technological. Economically powerful china will shift the epicenter of political power from the West to the east bringing a civilizational change. To maintain its economic, military and scientific growth, china will depend much on petroleum resources of the oil-rich countries around the world. Secondly, to maintain its strategic and military influence, china will use the Shanghai Cooperation Organization as a tool in the region. Because of geographic proximity to china, and changes in international relations after the September 11, the Muslim world countries are likely to develop closer relations with china to counter balance the Western influence on them.

Introduction

China's readjustment of its communist economic policies with capitalist market economy in the 1980s has led to notable developments that attract serious academic interests. Firstly, its rapid economic growth recently has turned it into the second largest economy in the world. As China booms economically and its global market-reach extends further, it has started pursuing an aggressive global economic diplomacy mainly in the form of resource-seeking investment. In this drive, China pays increasing attention on the oil-rich Muslim countries in Asia and Africa to meet its ever-growing energy needs. Secondly, concomitant to its economic growth, China has been experiencing a steady development in science and technology that is likely to make China one of the most

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advanced countries in the near future. And finally, an economically and scientifically powerful China is increasingly becoming more assertive in its military might which is likely to cause a shift in the balance of power at the global level. These factors of a rising China are likely to influence its relations with regional and international powers in the future.

This paper attempts to assess probable implications of China's rise for the Muslim world. It argues that two particular factors namely, geographical proximity between China and many of the oil-rich Muslim countries, and strain relationship between the West and the Muslim world since the end of the Cold War are likely to make China and the Muslim world foster closer economic and strategic relations making the later a direct beneficiary of a rising China. The Muslim world is a common term used in this paper to include 47 Muslim majority countries in the world. Those countries are divided in regional clusters such as South and Southeast Asia (Afghanistan, Bangladesh, Brunei, Maldives, Malaysia, Indonesia, Pakistan); Central Asia (Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan); the Middle East (Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, UAE, Yemen); north Africa (Algeria, Djibouti, Egypt, Eritrea, Libya, Morocco, Tunisia); west and Sub-Saharan Africa (Benin, Burkina Faso, Chad, Comoros, Gambia, Guinea, Guinea-Bissau, , Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leon, Somalia, Sudan). However, only major of these 47 economies will be discussed in this article.

Literature Review

Over the past one decade there has been an explosion of research on the rising China and its impact. These researches have dealt with various aspects of the issue that has generated serious academic debate in China as well as in the West. These literatures can be broadly placed in three categories. Firstly, the rising china as a global superpower that contains that China will become a dominant superpower in the 21st century with maintaining leverage of political, economic and military power throughout the world (Overhoults 1994; Bergsten et al. 2009; Martin 2009; Kim 2003; Turner 2009). A second category of literatures puts emphasis on the rising China as a threat and challenge to the American hegemony arguing that China will overpower the USA militarily and strategically in future (Kynge 2006; Fishman 2006; Sutter 2005).

However, there are some who argue that the rising China as a threat to the USA is a myth and implausible (Steinfeld 2010; Al-Rodhan 2007; Zhou 2007). Finally, a third category of the literatures focuses on regional implications of the rising China arguing that China's inroad into Asia, Africa and Latin American economies are putting it in loggerhead with other global powers paving the way for regional competition higher (Paz 2006; Meidan 2006; Ku 2006). These and many other studies focus on global and regional implications of the rising China in terms of economic, military, political and other strategic perspectives.

However, even though the issue of rising China has become some sort of a growth industry, the implications of the rising China for the Muslim world is almost missing in the academic discourse. The Muslim world is a special category in world politics that is a contested arena for the global powers such as the USA, Russia and the European Union. The countries in the Muslim world maintain super-power alliance according to their special interest and inclination which sometimes sway or become unstable. Especially, after the 9/11 incidents, relations between the Muslim world and the West has become shaky to the extent that the former is probably in search of an alternative to its existing Western allies. Does the rising China offer an opportunity to become as alternative? Though there are some studies on China's relations with individual or regional Muslim countries (Shichor 2006, 1979; Bin Huwaidin 2002; Calabrese 1991; Garver 2006; Zhang 1999), no work has looked at the implications of the rising China on the entire Muslim world. Therefore, such study is of special interest to explore a neglected aspect of the Rising China. The remaining parts of the article are divided into two broad sections: the scope, extent and implications of the rising China on a global plain; and the implications of it on the Muslim world.

The Scope of China's Rise

The scope of rising China can be estimated by looking at its socioeconomic and scientific growth performance during the past two decades. The 14th National Communist Party Congress in 1994 announced a ten-year policy called "socialist market economy" which fuelled the engine of contemporary growth. The consequence of the policy reflects in its achievements. According to the World Bank (2010) report, in 2009 China's Gross Domestic Product (GDP) was \$4,985.461

million, ranking third in the world after United States (14,119,000) and Japan (5,068,996), registering annual growth rate at 9.5 per cent; its GDP income per capita increased from \$293 in 1985 to \$3,650 in 2009. China registered a steady annual economic growth rate at an average of 10 per cent during the period 1990-2007. Compared to other major economies China's economic growth is impressive (see Table 1).

The most productive sector has been the industry. With a growth rate of 22.9 per cent, China's industrial sector has registered 48.9 per cent growth followed by services (39.3) and agriculture (11.7). The socialist market economy principle has created over 2,000 special economic zones (EPZs) attracting increasingly higher flow of foreign direct investment (FDI).

China's foreign exchange reserve stood at over \$ 2.8473 trillion by the end of 2010, the largest in the world. Foreign Direct Investment (FDI) inflows in 2009 reached to \$94.1 billion which is more than double of 40.7 billion in 2000, its trade balance was \$259.5 billion well ahead of Japan's \$82 billion as against \$38.3 billion US trade deficit (World Bank 2010).

In international trade, China became the third biggest trading nation after US and Germany. In 2009, China's current account balance was \$297.1 billion ranking number one in the world, compared to Germany \$160.627 (2nd) and Japan's \$149.731 (3rd). China's annual average growth of its export volume over the past 20 years has surpassed other major economies such as Japan, USA, UK and France (see Table 2).

According to the World Bank (2006), China's contribution to global economic growth is likely to surge from 12 percent in 2008 to 30 percent in the current decade (Business Week 2010). The country's rapid economic growth attracted major multinational companies, investment groups and security firms with investment in China's manufacturing, financial and service sectors. Observing China's contribution to global economy, Goldman Sachs has estimated that by 2030, the so-called BRIC economies (Brazil, Russia, India and China) will overtake those of Western Europe and North America.

China's economic growth is fuelled by its human resource development. For human development, the Chinese government in its 9th Five-Year

Plan in 1995 made a comprehensive education plan with “three orientations”- orientation towards modernisation, the whole world, and the future (MOE, 1995). This philosophy of education speaks for the visionary civilisational outlook for the future. The plan envisioned establishment and development of educational facilities that would, by 2010, ensure enrolment of 135 million primary school students, 21.35 million secondary school students, and increase of Higher Educational Institutions (HEI) to over 2000 which would enroll 6.5 million students. The plan targeted that “among every group of 100,000 population, the number of students in HE will be increased to 500 and 85% of the people aged 18-21 will be enrolled in HE. Among the students of HEIs, 6.3 million will be undergraduate students and sub-degree students and the annual growth rate will reach 2.8%. Postgraduate students will increase to 200,000 with an annual growth rate of 6.6%. Students enrolled in regular HEIs will reach 3.6 million with an annual growth rate of 3.8% and those in adult HEIs will reach 2.8 million with an annual growth rate of 1.7%” (MOE, 1995). This huge army of higher educated population will create an enormous stock of human capital for the country. By 2030, the country is expected to have millions of PhD holders in various fields of study. Increase in the levels of education and income will have an enormous impact on social mobility such as ownership of cars, urban residency and creation of virtual network community (see Table 3).

China’s education system is not only ethnocentric in the sense that its higher education in the 21st century will be with Chinese characteristics, but is increasingly becoming globalised and internationally recognized. According to the Chinese Ministry of Education, by the year 2000, China had “educational cooperatives and exchange relationships with 154 countries and areas, sent 300,000 students abroad for study to more than 100 countries and areas, received 210,000 foreign students from 160 countries and areas, sent 1800 teachers and experts to teach abroad and employed 40,000 foreign teachers and experts” (MOE, 2008). China has Agreement on Equivalence of Academic Degrees in Higher Education with eight east European countries, Germany and the UK, Australia and New Zealand. Educational agreement with the Western developed countries has opened up a more free flow of knowledge benefiting the rising China. Countries like the USA, Australia, Canada and New Zealand are among the major destinations for Chinese students. According to the education ministry of China, the estimated

Chinese students studying in these countries alone are 200,000 in the USA, 35,000 in Canada, 35,000 in Australia and 40,000 in New Zealand. The Chinese educational, scientific and economic growth and its future prospect has allured major multinational companies such as IBM, SUN Microsystem, Intel, CISCO, Motorola, Lucent, and Texas Instrument to invest in education in the form of scholarship and research grants to Chinese universities. Available data indicates that by the end of 2003, the amount donated by these companies reached 2.6 billion Yuan (MOE, 2008).

Rise of China in Global Competition

With its steady growth, China's presence at the global level is becoming more and more competitive, and considered an economic, political and military rival to the major powers.

Competition over Global Market

The rising China's access to global market became more aggressive with its accession to the World Trade Organisation (WTO) in 2001. In today's world, competition over global market is commensurate with domestic growth. China's current and projected domestic growth over the next 40 years is expected to be on the rise implying that its share of the global market is going to increase proportionately.

China's position in global competition is strengthening rapidly compared with major economies (Table 4). In 2009, it emerged as the largest trading nation in terms of merchandise export and second largest in terms of merchandise import, and its annual average growth in international trade surged by 17 and 15 per cent in export and import respectively, highest in the world. China's share in world exports has surpassed all other established economies, and in commercial service exports China is rapidly achieving the level of the developed economies which is evident in its surpassing of France, Germany and the UK in industrial properties patent grants in 2009. Earlier in 2007, China's share in world clothing exports jumped to 34 from 18 per cent in 2000, compared with the EU's (27 countries) jump to 30 from 29 per cent. In 2007, China ranked first (11.9 per cent) in world export and import of manufactured goods as a single economy. It became the world's topmost

exporter of office and telecom equipment (22.9 per cent) followed by Hong Kong (9.0 per cent) and USA (8.9 per cent).

Competition over Global Resources: oil and gas

The lifeline of China's economic growth, like for any other country, is energy, and therefore, China is desperate to secure this resource for the future (Constantine, 2007). During the next two decades the world energy consumption is expected to grow by 57 percent of which China and India will share 45 percent. China's energy consumption is expected to be doubled by 2030, amounting to \$3.7 trillion worth of investment. China gets its energy from four main sources: coal (80%), hydropower (15%), petroleum (2%) and gas (1%). While it has a proven 334 billion tons of coal reserve, its domestic supply of oil and gas is far less than its increasing demand (Wei, 2007). Therefore, to meet its energy needs, China depends on oil-rich countries, especially in Africa and Asia (Table 5). Its policy reads, "We need to take all possible measures to conserve oil, accelerate exploration of oil and natural gas resources, and make effective use of overseas resources" (Keisow, 2004). And in so doing China regards only business interest. "No matter if it's rogue's oil or a friend's oil, we don't care. Human rights? We don't care. We care about oil. Whether Iran would have nuclear weapons or not is not our business. America cares, but Iran is not our neighbor. Anyone who helps China with energy is a friend" (WP, 005). China's strategic oil reserve policy for 100 days by 2020 from its current storage capacity of 25 days further indicates its importance of imported energy. (In comparison storage capacity of other major economies are Japan 171, Korea 78, US 34), Germany 90, France 55, EU 90 days). Apart from relying on these energy sources, China is also rapidly resorting to nuclear energy. According to World Nuclear Association report (2011), currently China has 13 nuclear power stations in operation (which contribute 1.4% of total demand), 77 stations are under construction (of which construction on 27 has already started) and an additional 72 power stations are proposed. These power stations are expected to produce 400 GW by 2050.

To secure petroleum flow to the country, China follows a two-pronged economic diplomacy with natural energy-rich countries. One form of this diplomacy is global which involves petroleum and gas resource-seeking investment. The Forum of China Africa Cooperation (FOCAC)

is an example of this policy through which China invests in many oil-rich countries in Africa. The second form of diplomacy is regional, and military cum economic in nature. The Shanghai Cooperation Organisation (SCO), also known as the Shanghai Five, is an expression of this strategy. Through SCO, China ensures regional military security and stability in the Central Asian countries. It is through the same SCO forum that China extracts economic benefits of oil and gas flow from these countries. Apart from these two particular regions, China also invests heavily in the energy sectors of the oil-rich Gulf and Latin American countries such as Saudi Arabia, Kuwait and Venezuela. An elaborate explanation of the use of FOCUC and SCO diplomacy is in order in the following section.

Forum of China Africa Cooperation (FOCAC)

The FOCAC, launched in Beijing in 2000, is instrumental in fostering closer bilateral relations with 48 African countries which have proven natural oil and gas reserves. Following its second ministerial conference in Addis-Ababa in 2003, FOCAC achieved an impressive expansion which led to the Beijing Summit in 2006. This summit was the largest international summit in China, largest African summit outside of Africa, and the first and largest summit between a single host country and a continent of 48 countries, proclaiming the establishment of “a new type of strategic partnership” between China and Africa. The Beijing summit offered to achieve “political equality and mutual trust, economic win-win cooperation and cultural exchange” (CAF). Issued in January 2006, “China’s Africa Policy” mentions four broad principles and objectives: (1) sincerity, friendship and equality; (2) mutual benefit, reciprocity and common prosperity; (3) mutual support and close cooperation; and (4) learning from each other and seeking common development. The ‘policy’ includes cooperation in political, economic, education, science, health, social aspects, and peace and security issues encompassing 30 different areas (CAF).

The success of economic diplomacy between China and Africa during 2000-2006 is worth noting. The two-way trade between China and Africa reached US\$12.389 billion in 2002, an increase of seven times from US\$1.44 billion in 1991. The import on the Chinese side alone accounted for US\$5.427 billion and its export was US\$6.962 billion. At the Beijing summit the Chinese Premier proposed to push the trade

volume to reach US\$100 billion by 2010 which was more than double the 2005 volume of US\$39.7 billion. Indeed, in the first nine months of 2006, China-Africa trade surged to 40.6 billion which shows a 42 percent yearly increase resulting in achieving \$106.8 billion by 2008 surpassing the target of \$100 billion to be achieved by 2010. With trade volume increased, China has been offering financial concessions to its counterparts. For example, during the first ministerial conference in Beijing in 2000, China cancelled US\$10.5 billion debt of 31 African countries. During the Beijing summit in 2006, China further committed US\$3 billion of preferential loans in next three years and exempted more debts owed by the African countries. During the summit, Chinese and African companies signed 14 agreements worth US\$1.9 billion. As a result of closer cooperation, there are currently more than 800 Chinese companies working in the African continent.

Closer cooperation between China and Africa is also evident in other important areas. Since 2004, China has trained more than 11,000 African professionals in trade, agriculture, forestry, fishery, public health, telecommunications, education and environmental protection. China offers 1,200 government scholarships to African students every year, and by 2005 a total of 18,919 scholarships had been granted for higher education. China has established six Confucius Institutes in nine African countries to teach Chinese language and culture, and introduced 60 assistance programmes in 25 countries to develop basic infrastructure.

Among the African countries that received most attention from China are the oil-rich countries such as Algeria, Angola, Chad, Morocco, Nigeria and the Sudan. By far Sudan received the highest Chinese investment in oil sector. The China National Petroleum Corporation (CNPC) acquired 40 percent share in the Greater Nile Petroleum Operating Company (GNPOC) of Sudan in 1996 for US\$441 million. Between 1996 and 2005 the CNPC has invested US\$3 billion in Sudan, out of which a US\$1 billion was invested to build a 1506 km long export pipeline that started operation in June 1999. In 1999, China's CNPC invested US\$540 million sharing half the total cost of a new refinery, the largest in Sudan, together with Sudan's Energy Ministry. China provided engineering and technical expertise and equipments in the two investment projects, as well as in the building of Port Bashir – a two million ton oil terminal south of Port Sudan. The CNPC and China

Petroleum and Chemical Corporation (Sinopec) invested in the Sudanese Petrodar Operating Company (PDO) and bought 47 percent of its share. China Petroleum Engineering and Construction Group is building oil terminals worth US\$215 million in two new sites in the Melut Basin in Sudan. Since Sudan accounts for about 7 percent of the Chinese oil imports and with one of the largest unexploited oil resources in Africa, Sudan is likely to continue greater attention and investment from China.

Apart from Sudan, other oil and gas-rich countries in Africa are also attracting Chinese investment. In January 2005, the state-owned Chinese energy company, China National Offshore Corporation (CNOOC) Ltd., bought a 45 percent stake in an offshore oil field in Nigeria for \$2.27 billion (Taylor, 2007). The extent of Chinese global competition for oil and gas is representative of the fact that the top three Chinese oil companies (CNPC, Sinopec and CNOOC) have invested and are engaged in oil production in 22, 18 and 9 countries respectively in Africa, Middle East, Central Asia, East and Southeast Asia and North and South American countries.

It is not that the Chinese investment in oil industries abroad is to drain oil to China alone but to compete with oil giants in the global market. In terms of output capacity, the three top Chinese companies- PetroChina Co. Ltd (CNPC), Sinopec and CNOOC Ltd., are ranked 5th, 30th and 38th respectively at the global level. These companies are increasingly trying to get bigger share in the global oil market through open bidding and not by military and political manipulation that Western countries like the United States use. A classic example of strong presence of Chinese companies in the global oil market is demonstrated by the Chinese SINOPEC attempt to buy the American UNACOL with highest offer, though prevented by the American government intervention.

Competition over Geo-strategic and Political Influence

The Shanghai Cooperation Organisation (SCO)

China has been asserting its geo-strategic clout in the east and central Asian regions through various forums, especially the Shanghai Cooperation Organisation (SCO), otherwise known as the Shanghai Five. Officially founded in 2001 by six countries- China, Russia,

Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan – the SCO was primarily initiated with military and security objectives by five countries, excluding Uzbekistan, in 1996, in the wake of the rise of Islamic militancy in Afghanistan and Central Asia. Its five Cs objectives - confidence, communication, co-operation, coexistence, and common interest, over time have broadened to include economic dimensions as well (Chung, 2004).

The SCO is a useful tool that China can conveniently use for rival power play. Through it, China can counter and reduce the US and Russian geo-political, geo-strategic and geo-economic influence in the Central Asian region. The significance of this power rivalry is conditioned by the increased US military presence in Uzbekistan and Kyrgyzstan since 1994, especially after the September 11 incident. Both Russia and China, the two super powers and members of SCO, are uncomfortable with the US military presence in their close proximity which resulted in issuing a declaration by the SCO in July 2005 calling for the United States to set a timeline for its military withdrawal from the region. China views the American presence in the region as its military strategy to contain China. So, geo-politically, through the SCO China wants to counter security threats to it (Jia, 2007). In addition to military concern, China's geo-economic interest in the region is already explained in its relations with Kazakhstan and Uzbekistan. Apart from these two countries, China also maintains increasing economic ties with Kyrgyzstan and Tajikistan. And finally, geo-strategically China wants to control the three evils of separatism, fundamentalism and terrorism that the Muslim people of the Uighur province of China and a vast number of Chinese diasporas in the neighbouring member countries are engaged in. Furthermore, an additional geo-strategic advantage of a peaceful central Asia for China is its desire to construct oil pipelines through Pakistan to bring oil home at a cheaper cost (Sheives, 2006).

Competition over Military, Science and Technology

Chinese advancement in military, science and technology has been outstanding during the past few decades. Rapid growth of China needs to be sustained by skilled intellectuals and scientists that become the core of Chinese modernisation and development. China's expenditure on science and technology and its growth of Research and Development (R&D) personnel has brought the country among the top ranking nations

in the world. On a global scale, in terms of R&D expenditure China ranks 6th, in terms of R&D personnel it ranks 7th, in terms of acquiring patents on invention it ranks 5th, and in terms of global percentage of publishing scientific articles it ranks 2nd (Table 6).

A cursory look at Chinese military expenditure is indicative of its staggering arms build-up (Table 8). According to Stockholm International Peace Research Institute (SIPRI) estimate, in 2009 China's military expenditure was 98,800 millions (2.0 per cent of GDP) which was increased from 31,200 millions in 2000 and 17,500 millions (2.6 per cent of GDP) in 1990. As such, in 1990 China had the lowest expenditure on military compared with other top spenders- USA, Russia, UK, France and Germany where USA had the highest expenditure (504,534 millions). But in 2009, China became the second biggest spender (about 100 billions) in the world after the USA (663 billions). One of China's most recent successes in military technology is its demonstrated capacity in 2007 to launch and kill defunct spacecrafts in the space from the ground. The modernization of China's arms build-up has also made China a leading arms supplier to the world. According to SIPRI data, China consistently maintained its position as seventh out of top ten arms exporting countries during 1990-2009 (Table 9). China has become a competitive supplier of conventional and sophisticated arms such as light weapons, small firearms, anti-ship, and surface-to-surface missiles. Countries like Burma, Pakistan, Sudan, Saudi Arabia and Zimbabwe are major destinations of Chinese weaponries (Weitz, 2008). Though such type of arms transfer does not yield much revenue, it gives China leverage over these countries under international embargo to access important energy and raw materials.

The most spectacular development is China's science and technology, especially space technology. The space technology program, launched in 1956, has made China a leading global competitor. Currently China ranks among the most advanced countries in space technology fields such as satellite recovery (ranks 3rd in the world), rocket with cryogenic fuel, multi-satellite launch with a single rocket, strap-on rockets, launch of geo-stationary satellites and TT&C (ranks 5th), remote sensing satellite, telecommunication satellites, and manned spacecraft missions (SCIO, 2000). China's first success in launching unmanned experimental spacecraft- "Shenzhou"- in 1999 symbolised a breakthrough in indigenous space technology. The Chinese government

maintains an ambitious and visionary outlook in “The National Guideline for Medium-and Long-term Plans for Space and Technology Development 2006-2020” for its space industry (Chinaview, 2006). The guideline draws a “three-step” space programme: sending a human into orbit, docking spacecraft together to form a small laboratory and finally, build a large space station. The 11th Five-Year Plan (2006-2010) includes the launch of the country’s first astronomy satellite in 2010 which will carry a hard X-ray modulation telescope to research black hole physics. As part of the program, China in 2003 became the third nation after the USA and Russia to put a man into orbit and in 2008 its third manned space mission successfully completed the country’s first spacewalk (BBC, 2008). Analysts believe that China can land on the moon by 2020 breaking the US space hegemony (Rincon, 2008; Carl, 2007).

The formidable rise of China in its military, science, and technology is clearly shifting the balance of global power. In the year 2000, the US National Intelligence Council warned that, “China by 2015 will have deployed several tens of missiles with nuclear warheads targeted against the United States....[and] would seek to adjust regional power arrangement to its advantage...” (NIC, 2008). Such a possibility is justified by the American missiles and nuclear warheads stationed in Japan and South Korea. An influential policy paper has commented on the extent of Chinese military might in the 21st century saying that, “[t]he Middle East is just a blip. The American military contest with China in the Pacific will define the twenty-first century. And China will be more formidable adversary than Russia was ever” (Kaplan, 2005).

The Rising China and the Muslim World

How is the rise of China influencing its relations with the Muslim world? An analysis of the trend in China-Muslim world relations can indicate that the rise of modern China is clearly bringing it closer to the Muslim world in several ways. Firstly, as discussed earlier, China’s insatiable thirst for energy is motivating it to reach out the oil-rich Muslim countries in the Middle East, Central Asia and Africa. Apart from China’s oil and trade deals with Muslim countries in Africa, China depends heavily for petroleum on other Muslim countries namely Saudi Arabia, Iran, Kuwait, Oman and Qatar in the Middle East. In the

following discussion, particular focus is placed on some major economies of the Muslim world.

Saudi Arabia

With the establishment of formal diplomatic relations between the two countries in 1990, Saudi Arabia, the world largest petroleum exporter with proven crude oil reserves of 261.9 billion barrels, and China, with ever increasing demand for oil, developed strategic relationship gradually, commencing with Chinese purchases of Saudi Arabian crude oil. During the decade of 1990s, economic ties between Saudi Arabia and China grew considerably, particularly in the area of crude oil purchases, which reached a peak of 86,000 barrels per day in 1995. The Saudi oil flow to China surged enormously by 59 percent during 2005 following September 11 incident. This increase in oil trade brought the two countries even closer so as to sign a cooperative agreement in January 2006 which made KSA the largest crude oil provider to China. The agreement also made KSA the largest trade partner and second largest export market for China in the region of West Asia and Africa. As a result, the bilateral trade relation that was below \$2 billion in 1999 rose to \$15 billion in 2005, and by 2010 it was expected to reach \$40 billion (Hurst, 2007). In retrospect, Saudi Arabian companies are investing heavily in China recently. The Saudi Basic Industries Corporation has invested US\$1 billion to build a petrochemical plant in China (PINR, 2007).

Apparently economic market and opportunities strengthened their relations further through frequent high profile diplomatic and state visits during 2009. During such visits the Chinese companies altogether completed US\$7.95 billion of contracting project and labor services cooperation in Saudi Arabia. There were 82 Chinese-funded enterprises and 19,000 Chinese staff in Saudi Arabia. In 2009, the two sides signed 35 new agreements including the Makkah light railway and the Rabigh power plant with a total value of US\$6.27 billion.

The extent of the relation is explicitly reflected in the trade relations between the two countries. The earlier target of \$US 40 billion to be achieved by 2010 was already achieved well ahead by 2008 which created the prospect for setting a conservative goal of \$60 billion by 2015 during the state visit of the Chinese Minister of Commerce in

2009. During the 2003-08 period, China-Saudi Arabia trade registered annual growth rates of 30 to 50 percent. In 2008, bilateral trade surged by 64.7 percent to \$41.8 billion, two years ahead of the goal set in 2006. The growth rate was affected by the global financial crisis in 2009, yet its share in oil remained very high. China's crude oil imports rose by over 12 percent in 2008 to 800,000 barrels per day. During 2009, China's crude oil imports increased by 13.9 percent to 200 million tons. Apart from economic relations, cultural and religious cooperation is also on the rise. In 2009, China arranged pilgrimage to Saudi Arabia for nearly 13,000 Muslims.

Kuwait

Kuwait is another Muslim country with which China's relations have improved tremendously since their establishment of diplomatic relations in 1971. But the depth of relations started to widen since 1990. From the Chinese side there are at least 17 high profile state visits registered to Kuwait during 1989- 2008, while 21 similar Kuwaiti visits were made during 1990-2009.

According to Kuwait News Agency (Kuna), trade volume between Kuwait and China reached to \$2.8 billion during 2006 and 2007 which was one-fifth of the total trade between China and the GCC states (\$15bn) during the same period. The volume increased in 2008 to US\$6.78 billion, of which the Chinese export was US\$1.74 billion, and import US\$5.04 billion. Kuwait has been the largest supplier of preferential official loans to China among Arab countries. From 1982 till now, the Kuwait Fund for Arab Economic Development had provided China with US\$ 810 million of loans on favorable terms. In 1998, the Kuwaiti Government donated a total of US\$3 million of cash to the Chinese Government when China suffered from serious floods.

Recently, the Kuwaiti government and three Chinese companies signed an agreement on the first phase of construction of a 35 kilometer long sea bridge valued at Dhs1.8bn (KD117.7m) linking the island of Boubayan with the Kuwaiti mainland. On the other hand, Kuwait has built a \$5 billion refinery and petrochemical industry in China in 2010, the National Bank of Kuwait has opened a representative branch in Shanghai, a Kuwait-China Investment Co. (KCIC) is established in 2005 with a total share of \$ 300 million, the Kuwait Investment Authority

owns a large share in the Industrial and Commercial bank of China, and Kuwait has been the largest supplier of preferential official loans to China among the Arab countries.

Iran

China maintains special economic relations with Iran with multibillion dollars of investment, of which the most recent is the US\$2 billion dollars deal signed in 2007. China could not be deterred by the Iran-Libya Sanction Act (ILSA), 1996 of the USA that even penalises foreign companies for investing in Iran over \$20 million. The two countries have even come closer. China said to have imported 170,000 bpd of oil from Iran in 2000, which jumped to 244,000 bpd in 2006. And according to a recently signed agreement, Sinopec of China is to buy 250 million tons of liquefied natural gas from Iran over the next 30 years (Hurst, 2007). Furthermore, Iran is the first Muslim country where Chinese automaker Cherry has invested \$375 million to open a production base (Gundzik, 2007).

Probably the most important Chinese partner in the Muslim world is Iran. Despite Iran being under international sanction since long, its extensive economic relation with China continued to grow. This is substantiated by the fact that more than 100 Chinese state owned companies operate in Iran. Compared to just \$400 million trade transactions only 15 years ago, China became Iran's top most trade partner in 2009 with bilateral exchange totaling \$21.2 billion which is expected to reach \$200 billion by 2020.

The most thriving sector is energy which earns about \$16 billion annually for Iran. Chinese firms have signed \$12 billion contracts in the Iranian hydrocarbon sector during 2005-2010. China's massive interest in Iran's energy sector is evident in the following development such as in 2008, the China National Petroleum Corporation (CNPC) and the National Iranian Oil Company (NIOC) signed a \$1.76 billion deal to develop Iran's North Azadegan oil field, which could produce upwards of 75,000 barrels of oil per day by 2012. In March 2009, Iran and China signed a \$3.2 billion gas deal, in which Iran's LNG and a Chinese-led consortium agreed to construct a pipeline to extract some 10 million tons of liquefied natural gas from phase 12 of Iran's South Pars gas field. Soon after, in June 2009, CNPC inked a \$5 billion deal with NIOC to

help develop phase 11 of the field. The project is designed to produce roughly 2 billion cubic meters of gas and 70,000 barrels of gas condensates daily. CNPC replaced the French energy giant Total after it withdrew from the project. In addition, between July and November of 2009 various state and private companies of China have signed investment deal in the energy sector totaling \$58.5 billion. The trend continues well in 2010 in efforts such as Chinese interest in Iran-Pakistan-India (IPI) gas pipeline, and its 300% increase in presence at Iran's 15th International Oil, Gas, and Petrochemical Exhibition in April 2010

Apart from energy sector, Chinese investment in Iran's other economic sectors is rapidly increasing. In May 2009, at a joint economic conference in Tehran, the two countries signed a number of agreements totaling \$17 billion in economic cooperation. The agreements stipulated that China assist Iran with its construction sector, host joint trade meetings, and develop Iran's railway system. Iran will also build a new trade center in China's majority Muslim Xinjiang province. Furthermore, Chinese officials have expressed their interest in expanding participation in the development of Iran's titanium deposits and mining infrastructure. According to Amir Talebi, an official with the Trade Promotion Organization of Iran, his country's principal exports to China consist of "propane, iron ore, polyethylene, aluminum, copper, marble, chrome ore, cast iron, lead, concentrated licorice, and sulfur." Talebi added that China assists Iran in building dams, shipyards, ports, airports, in mine-development, and oil and gas infrastructure.

In February 2010, Managing Director of the NIOC Seifollah Janshnaz encouraged China and Iran to conclude new agreements and went so far as to say that his government expects to see bilateral trade reach \$50 billion in the "near future." Iran's ambassador to China, Mehdi Safari, reiterated the \$50 billion goal in June 2010 while speaking at Iran's National Pavilion at the 2010 World Expo in Shanghai. According to the ambassador, trade ties will have to enter into "a new phase" in order to reach the ambitious goal. Safari has made even more grandiose predictions in the past, saying upon his arrival in China in May 2010 that the value of bilateral trade could rise to as much as \$200 billion by 2020.

Central Asian Muslim Countries

China has proposed a series of ambitious railroad projects that would connect the country's heartland with Central Asia, linking China with Iran via Kazakhstan, Uzbekistan, and Turkmenistan. In an effort to deepen transportation ties between the two countries, Iranian Minister of Roads and Transportation Hamid Behbahani met with Chinese Railway Minister Liu Zhijun in June 2010. During their discussions, the Chinese minister welcomed offers by Behbahani, who encouraged China to use Iran's rail network to connect its own to Europe

Apart from bilateral relations, the multilateral forum of SCO is also instrumental in bringing China and a number of regional Muslim countries closer. Under the framework of SCO, China has established extensive economic and trade relations with the resource-rich Muslim states in Central Asia, and particularly with Kazakhstan. Kazakhstan has grown to be an important player in the global oil market, having the Caspian Sea's biggest oilfields in its possession, with an estimated reserve of 29 billion barrels. China has been operating in Kazakhstan for 8 years as a foreign investor, foremost through CNPC which has been involved in several projects in the country. For instance, CNPC has acquired 60 percent of Kazakhstan's Aktobermunaigas Corporation, now known as CNPC Aktobe, in May 2004. The investment is considered as the most significant oil investment made by a Chinese company so far (Swanstrom, 2007).

In August 2005, CNPC closed a US\$4.8 billion deal to acquire PetroKazakhstan (PK), a Canadian based oil company operating in Kazakhstan. PK is one of the biggest operators in the country and CNPC's purchase of the company is indicative of China's solid presence in Kazakhstan. PK's production arm is also located near the Chinese border making it strategically close to the fast growing market in China. By purchasing PK, CNPC gets access to a good refinery, as well as reserve and production facilities, and the oil can be transported through the jointly built pipelines (Cohen, 2006). Together with KazMunaiGaz – Kazakhstan's state oil company – CNPC has undertaken construction of a grand pipeline called the Atasu-Alashankou pipeline. The first two sections of the pipeline, Aktobe-Atyrau (Kazakhstan), and Atasu (Kazakhstan)-Alashankou (China), are already completed and started shipping 50,000 bpd to since July 2006. The final section of the pipeline,

Kenkiyak-Kumkol (Kazakhstan) will connect the earlier two sections by stretching the grand line over 3022 km. Similarly, the Chinese CNPC has signed a \$600 million deal with Uzbekistan's Uzbekneftegaz and joined a consortium of Malaysian, South Korean and Russian companies to carry out exploration near the Aral Sea.

Indonesia and Malaysia

China and the two major Muslim countries in Southeast Asia namely Indonesia and Malaysia also enjoy intensive economic and strong political relations. Despite their long diplomatic relations, Indonesia and Malaysia have experienced stronger economic relations only in recent decades. In the case of China-Indonesia relations, rather an opposite trend is noticeable. Indonesia's investments in China are nearly 20 times more than China's investments in Indonesia. According to Chinese government statistics, Indonesia's investments in China totaled up to 970 projects with contract value of US\$ 2.024 billions till March of 2003. On the other hand, China has opened in Indonesia 60 non-trading joint ventures and enterprises under joint management, with their investment totaling US\$ 0.27 billions (Ministry of Commerce of the People's Republic of China 2004). In June of 1996, the Chinese People's Insurance Company opened a branch in Jakarta. In April of 2003, Bank of China reopened its branch and business in Jakarta.

As usual, in Indonesia also Chinese investment is increasingly moving to energy sector. In January of 2002, CNOOC has inked a deal worth \$585 million for the Indonesian oil operations of Spain's Repsol-YPF. It makes CNOOC the largest offshore oil producer in Indonesia. In February of 2004, CNOOC succeeded in buying 20.77 percent of British BG's shares in Muturi Ltd at a price of US\$ 9.81 million and CNOOC became the biggest stockholder of Muturi Ltd. In April of 2002, China's largest oil company, PetroChina made its first overseas purchase in Indonesia worth \$216 million for American Devon Energy Corp.'s oil and gas operations in the country. So the increase in investment in recent years has taken place in the oil and gas sectors, valued at about US\$ 1 billion.

Apart from petroleum and investment related transactions, a particular type of relation that is increasingly becoming stronger between China and the Muslim world is the military one. Besides Iran and Pakistan as being traditional recipients of Chinese military weaponry, more and

more Muslim countries are joining the list. Table 7 lists top five Muslim countries in terms of quantity of weapons purchased from China during 1990-2009. In terms of quantity of arms ordered, Pakistan ranks first, followed by Bangladesh, Iran, Kuwait and Sudan. Among these countries, Iran and Sudan are under international economic sanction, and Pakistan and Bangladesh had been traditional recipients of Chinese arms since 1960s. Other Muslim countries that are recipients of Chinese arms are such as Saudi Arabia, Nigeria, Niger, Gabon, Egypt, Indonesia, UAE and Iraq.

Implications of the Rising China for the Muslim World

There is an old Arabic-Islamic saying that states “seek knowledge, even if it takes to go to China.” This saying implies that China was long known to the Muslim world for its civilizational prosperity, knowledge and development. It also implies that fostering closer relation with China was encouraged at least for knowledge, technology and scientific purposes. What are the likely implications of the rising China for the Muslim world today? There are a number of observations that can be made. First, as China rises globally, its share in trade and investment is also rising significantly with the Muslim world. However, China’s closer relationship with the Muslim world has not gone un-noticed by other major power. The China-Africa partnership initiative has drawn much attention from and created concern in the West (Swan, 2007). China is accused of pursuing colonial blueprint in Africa, and is criticised for bypassing human rights issues in economic relations with African countries (Large, 2006). For instance, Chinese investment in Sudan ignoring the Darfur issue is criticised by the West to an extent that some have even suggested boycotting the China Olympics in 2008 as protest of Chinese policy towards Sudan. Concurrently, some Western countries have been pressuring China to use its investment card to influence Sudan’s domestic policy towards Dar Fur. However, Chinese policy towards Africa is clear – “no string attached” and “non-interference with domestic political issues.” This policy of China has made its role all the more attractive, trustworthy and popular compared to Western aid with political strings attached such as democracy and human rights. The Muslim countries might find this approach of China an alternative avenue to foster greater cooperation with this emerging power and forge an alternative alliance.

Second, Chinese economic policies with Muslim countries in Africa and Asia are generally defined as “partnership,” “political equality,” and “win-win cooperation.” China invests in these countries directly for infrastructural development instead of traditional set up of official development agencies. In this way, Chinese investment is considered to be more tangible, readily beneficial and economic in nature. Furthermore, China’s investment and foreign aid to most of the Muslim countries usually require no political preconditions. While the Western powers have imposed economic sanctions on countries like Iran, Sudan and Syria on political grounds, the Chinese aid and investment flow is largely with no such string attached. In other words, China’s investment is based on non-intervention in domestic affairs. This approach of China makes it more popular and acceptable in the Muslim countries as a reliable partner for development and friendship.

Third, the SCO has been fostering a closer tie between China and the regional Muslim countries which has generated much concern in the West (Bates, 2007). It is believed by some that in the wake of growing unilateralism by the US after the end of the Cold War, SCO is an attempt to counter the US influence in the Far East and Central Asia (Graham, 2007). The significance of the SCO has increased further due to the US-led invasion of Iraq which has created much distrust on USA and put the Muslim world at a greater risk. Therefore, while maintaining traditional relations with the US, the Muslim countries may find SCO more attractive to increase their collective power by aligning with an alternative power pole. Iran in particular appears to be very enthusiastic about forging such a relationship to counterbalance the US pressure on it. The Russian and Chinese insistence on using diplomatic solutions to Iran’s nuclear issue, and their increasing investment in Iran have made the country rely more on Chinese and Russian friendship. Iran’s intention to join the SCO can be interpreted as seeking for a multilateral institutional platform to counter the Western pressure. In this process, Iran is likely to deepen its relations with China creating stronger interdependency.

Finally, once China acquires trust and confidence of the Muslim world, it is likely to become an alternative source of arms acquisition for the Muslim countries given the astounding development of Chinese military and space technology. It is already evident that apart from China’s special military relations with Pakistan and Iran, China’s arms market is

fast growing in Africa and some gulf countries (Shichor, 2000). However, given all these developments and change in trend, the big question remains- will China maintain its neutrality and non-interfering stand in its developing relations with the Muslim world? This is a big question that China should keep into consideration so as to prevent itself from falling into a hegemonic imperialist risk.

Conclusion

The rise of China is clearly visible in the international political economy. It is becoming an economic giant with immense potential to surpass even the US economy. It has already surpassed the Japanese dominance, shifting the balance of power in the region. Its economic engagement with Africa is causing much irritation for certain countries in the West. China is becoming the largest single energy consuming country and much of its energy comes from the Muslim world. Not only gas and oil that are flowing to China from Muslim countries but petrodollars from the oil-rich Muslim countries are also finding China an attractive destination for investment. Above all, China is acquiring trust of the Muslim countries for being non-interventionist in their domestic affairs. Clearly, the Muslim world might increasingly find China as an alternative superpower patron to counter the influence of the West. If the present trend continues, the prophecy of Huntington on Islamic-Confucian alliance building in the process of Clash of Civilizations may not sound too fanciful in the future.

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Appendix

Table 1: A Comparison of GDP Growth of China with Major Economies

Economies	00-01	01-02	02-03	03-04	04-05	05-06	06-07	2017 (forecast)	2035 (forecast)
China	7.3	8.0	9.0	10.1	10.2	10.7	10.0	9.5	5.6
USA	0.3	2.4	3.1	4.2	1.0	2.8	2.2	2.8	
UK	2.2	1.8	2.2	3.1	3.2	2.9	-	-	
Japan	-0.6	0.3	2.7	2.7	2.6	2.2	2.3	1.6	
Germany	0.6	0.6	-0.1	1.6					
France	1.8	1.2	0.5	2.3	1.2	2.0	-	-	

Source: Compiled from *World Development Indicators*, 2003, 2004, 005, 2006, 2007, and 2008, Washington: The World Bank.

Table 2: Annual Average Growth of China's Export Volume Compared with other Major Economies

Economies	1985-95	2000-2008
China	15.1	20.5
Japan	2.4	6.0
France	8.2	3.5 European Union (27)
UK	4.6	
USA	5.1	3.5

Source: *World Development Indicators* 2008 and 2009, Washington D.C.: The World Bank, accessed online August 3, 2011.

Table 3: Projected Social Mobility in China by 2017 compared to Japan and USA

Economies	Possession of cars per 100 households	
	2006	2017
China	4.76	16.99
Japan	75.00	82.40
USA	87.52	89.18
Urban population (% of the total)		
China	43.7	51.4
USA	81.1	84.1
Internet users ('000)		
China	153,431	448,038
USA	182,779	219,851

Source: Compiled from *International Marketing Forecasts 2008*, 11th Edition, London: Euromonitor International.

Table 4: China's Rank in World Trade in Comparison with Major Economies, 2009

World Trade Items	Global Rank and Position					
	China	France	Germany	Japan	UK	USA
Merchandise Export	1	6	2	4	10	3
Merchandise Import	2	4	3	5	6	1
Commercial Services Export	5	4	3	6	2	1
Commercial Services Import	3	6	2	5	4	1
Annual Average % Change in Exports of Goods and Services 2000-2009	17	0	4	2	2	3
Annual Average % Change in Imports of Goods and Services 2000-2009	15	2	3	1	2	1
Share in World Total Merchandise Export	9.60	3.87	8.94	4.6	2.82	8.43
Share in World Total Merchandise Imports	7.91	4.40	7.28	4.34	3.80	12.62
Share in World Total Commercial Services Export	3.80	4.20	6.67	3.72	6.75	14.7
Share in World Total Commercial Services Import	4.92	3.92	7.86	4.75	4.90	10.40
Patent Grants of Industrial Property By Patent Office	128489	10529	14435	193439	5428	167349
Trademark Registration of Industrial Property by office	818633	4675	54542	103575	27642	178780

Source: Compiled from country data of the *World Trade Organisation* (WTO) available at <http://stat.wto.org/CountryProfiles>, accessed August 3, 2011.

Table 5: Global Presence of Four Biggest Chinese Oil Companies

Items	CNPC	Sinopec	CNOOC	Sinochem
Year of establishment	1988	2000	1982	1950
Number of Countries operating in	33	26	12	
Revenue 2009 (USD Million)	165 496	187 518	30 680	35 577
Profit 2009 (USD Million)	10 272	5 756	3 634	659
Assets (USD Million)	325 384	188 793	41 943	25 136
Employees	1 649 993	633 683	65 800	44 256
Spent on Merger & Acquisition, 2009	18.2 billion (13% of global total)			
Global Ranking (Fortune 500)	10	7	252	203

Source: Compiled from Julie Jiang, Jonathon Sinton, *Overseas Investment by Chinese national Oil Companies: Assessing the drivers and impacts*, Paris: International Energy Agency, 2011; *CNPC Annual Report 2010*, *Sinopec Annual Report 2010*, *CNOOC Annual Report 2010* and *Sinochem Annual Report 2010*.

Table 6: China's Position in Science and Technology Research Performance, 2010

R & D	China	India	UK	USA	Germany	France	Russia	Japan
GRED*	1.5	--	1.8	2.8	2.6	2.0	1	3.4
Share in Triadic Patent**	1.1	0.14	27.0	49	12.1	5.0	0.13	28.0
Articles per million population	156	35	1250	911	820	800	176	635
World % of scientific articles	12	--	4.5	16	4.0	3.0	1.5	4.8
Researchers per 1000 employment	2.1	0.9	8	10	7.5	8.4	6.4	11

Keys:

*GERD- Gross Expenditure on Research & Development

**Triadic- European Patent Office (EPO), United States Patent and Trademark Office (USPTO), and Japan Patent Office (JPO)

Source: *OECD Science, Technology and Industry Outlook 2010*, http://www.oecd.org/document/12/0,3746,en_2649_34451_46658636_1_1_1_1,00.html, accessed August 3, 2011.

Table 7: Chinese Transfers and Licensing of Major Conventional Weapons to Top Five Muslim Countries, 1990 to 2010

Countries	Number of times order placed to china	Total quantity ordered to china	China granted license to make weapons	
			Number of times	Total number
Pakistan	29	2079	9	2172
Bangladesh	25	1180	--	--
Iran	13	605	7	2560
Sudan	8	110	--	--
Egypt	2	41	1	80

Source:

Generated from online SIPRI Arms Transfers Database,
http://www.sipri.org/contents/armstrad/at_data.html, accessed 29 July 2011.

Table 8: Military Expenditure: A Comparison with Major Economies (US\$ Millions, % of GDP)

Country	1990/GDP	2000/GDP	2009/GDP
USA	504,534 (5.3)	377,228(3.1)	663,255 (4.3)
China	17,500 (2.6)	31,200(1.8)	98,800(2.0)
Russia	266,000(12.3)	29,700 (3.7)	61,000 (3.5)
France	71,581 (3.4)	62,707 (2.5)	67,316 (2.3)
UK	68,669 (3.9)	54,055 (2.4)	69,271 (2.5)
Germany	72,902 (2.8)	51,487 (1.5)	48, 022 (1.3)

SIPRI: <http://www.sipri.org/databases/milex>

Table 9: SIPRI Trend Indicator Values (TIVs) of Arms Exports from the Top 10 Largest Exporters, 1990-2009 (US\$ m. at constant (1990) prices).

Rank 1990-2009	Supplier	1990	2000	2009	1990-2009
1	USA	10495	7220	6795	191289
2	Russia		3985	4469	78702
3	Germany	1774	1603	2473	35998
4	France	1638	1055	1851	32446
5	UK	1841	1484	1024	25831
6	USSR	10243			15922
7	China	931	272	870	13302
8	Netherlands	405	280	608	10282
9	Italy	172	189	588	7572
10	Ukraine		288	214	7095

Source: http://www.sipri.org/contents/armstrad/output_types_TIV.html

Role of Geopolitics in Import Shares of Leading Trade Partners in GCC Import Markets

Nader Habibi¹

This study focuses on how the market shares of leading exporters in the GCC (Gulf Cooperation Council) countries have been impacted by major geopolitical events. The SUR regression model is used to investigate the impact of important events on relative markets. The main hypothesis is that GCC imports from the US are sensitive to the US involvement in the Arab-Israeli conflict and US military interventions in the Middle East. To investigate this theory, four important geopolitical events are considered: Gulf War I (1991), Second Palestinian Intifada (2000-2001), The September 11 terror attacks (2001) and the US invasion of Iraq (2003-2004). The statistical results suggest an association between both, the Gulf War I and the US invasion of Iraq, and changes in US market share in GCC imports. We observe a positive association between Gulf War I and the US market share in the aggregate imports of the GCC countries. On the other hand, the statistical results suggest a negative association between the invasion of Iraq and the US market share in aggregate imports of the GCC occurs. Among GCC countries, this negative association is only significant for the US market share in Saudi Arabia. Finally, the results for the second intifada/September 11th attacks are mixed.

1. Introduction

In recent years, the high prices of crude oil and natural gas have increased the purchasing power of oil-exporting countries of the GCC. As a result, competition among major industrial countries for export of goods and services to the GCC nations has intensified. For industrial countries, which have had to pay considerably more for crude oil and oil

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products since 2000, the GCC import market has become more significant than before.

The available import data for the GCC shows that as the total volume of imports for these countries has sharply increased in the past 10 years, the relative market shares of their trade partners have not remained stable. The market shares fluctuated over time and some countries even gained market share at the expense of others. In this article the market shares of the United States, Western Europe, Japan and China in the import markets of GCC countries will be analyzed. First, each exporter's market share will be tabulated and observed to see if any noticeable time trends stand out. Then, statistical analysis will be used to identify the economic and non-economic factors that had a significant influence on each exporting country or region's market share. The six member states of the GCC, namely Saudi Arabia, the UAE, Kuwait, Oman, Bahrain, and Qatar benefited significantly from the 2002-2008 oil boom and their import markets experienced the sharpest growth among Arab countries in recent years.

Economic factors such as the size of the domestic economy (GDP), exchange rate policy, and import tariff rates affect mainly the value of the total imports of a given country. However, both economic and geopolitical factors influence the relative market shares of each trade partner in total imports and in some occasions the non-economic factors, can play a more dominant role. For example, if a specific commodity (i.e. rice) can be purchased from several countries and all producers are selling at competitive prices, a buyer might take geopolitical factors into account when deciding which country to buy from². While the empirical analysis in this article will pay attention to both economic and non-economic factors, the primary goal of this study is to shed light on the role of geopolitical factors.

The geopolitical factors are particularly important for the US trade relations with GCC countries because of the complex strategic and

² Economists have generally been more interested in studying the volume of bilateral trade among nations than the relative market shares. The most common analytical model for analysis of bilateral trade is the gravity model, which assumes that the volume of trade between two nations is a function of the size of their respective economies (GDP) and the distance between them. Tinbergen (1962) first introduced the gravity model.

security relations between the US and some Arab countries as well as the unique role of the US in the Arab-Israeli conflict. These two dimensions of the US' Middle East policy generate mixed feelings in some Arab countries. On one hand, the US plays a crucial role in providing external security to several Arab countries (particularly in GCC) and strengthening moderate Arab regimes against their domestic opponents. The ruling elites in these countries are appreciative of the US' role and might be encouraged to favor American products to show this appreciation.

On the other hand, they are frustrated by the continuous US support for Israel in its ongoing conflict with the Palestinians and neighboring Arab countries³. This frustration could reduce the popularity of US goods in the GCC countries as the GCC governments and private importers might decide to purchase their imports from countries that show more sympathy for the Arab positions in this conflict. For example, during the second Palestinian Intifada (2000-2001), a large number of Arab non-governmental organizations (NGOs) launched a grassroots campaign to boycott American products to protest the US support for Israel (Blanford, 2002).

Another important factor in bilateral trade relations is trade agreements. Bilateral trade agreements between two nations will lower the barriers to trade between them and hence give each country a trade advantage over other competitors. Multilateral trade agreements such as membership in World Trade Organization (WTO) limit the ability of a member nation to favor a specific trade partner imposing discriminatory tariffs or quotas. In recent years, the WTO admitted all of the GCC countries, Saudi Arabia being the last to gain admission in 2005⁴.

Both, the United States and European Union, have had some success in signing free trade agreements with the Arab countries. The United States signed bilateral trade agreements with Bahrain (2005), Morocco (2004),

³ This frustration is best exemplified by a letter that (then) Prince Abdullah of Saudi Arabia wrote to the US president Bush in August 2001. In this letter, Prince Abdullah acknowledged the long history of US-Saudi relations but warned that if the United States continues its one-sided support for Israel, the special relations between two countries might come to an end. See: <http://www.pbs.org/wgbh/pages/frontline/shows/saud/cron/> (cited September 2012).

⁴ Currently ten Arab countries enjoy WTO membership, whereas six other states have observer status, which will eventually pave the way for access to negotiations.

Jordan (2000), and Oman (2008). The Bush administration initiated trade negotiations with several Arab countries including the UAE with the long-term goal of replacing these bilateral trade agreements with a comprehensive US-Arab Free Trade Agreement⁵. These negotiations were pursued less vigorously by the Obama administration; furthermore, no new FTAs with Arab countries have been signed after 2008.

The European Union is also negotiating a free trade agreement with the GCC although these negotiations have been underway for more than two decades and some fundamental differences are yet to be resolved⁶. In more recent years, Japan, China, and India have also expressed interests in signing free trade agreements with GCC countries. Several rounds of trade talks between these countries and the GCC have already occurred⁷.

The rest of this article is organized into four sections. Section two analyzes the recent trends in aggregate imports of GCC countries and the relative market shares of their trade partners. Section three reviews the academic literature on the impact of political and diplomatic factors on bilateral trade among nations. Section four describes the theoretical foundations of the statistical model. The statistical analysis and its results will be discussed in section five followed by the conclusion.

2. Recent Trends in GCC Import Markets

As shown in Graph 1-a, the total merchandise imports of Arab countries⁸ has increased sharply since 2001. It increased by 347% from \$147.6 billion in 2001 to \$659.5 billion in 2008. The six GCC countries generated most of this growth. The merchandise imports of GCC rose by 375% during 2001-2008 as their oil export revenues reached record high levels. Merchandise imports include all imported manufactured goods and raw materials. The manufactured goods, machinery, and transport

⁵ For more detail on US trade agreements with Arab countries see Lawrence (2006).

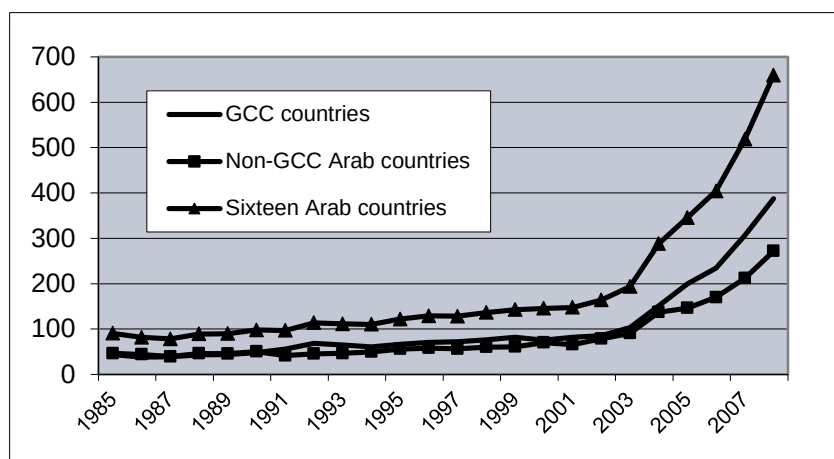
⁶ A major point of disagreement in EU-GCC trade negotiations is the refusal of the European Union to open its petrochemical market to GCC exports.

⁷ The first round of trade talks between China and GCC countries was held in Riyadh in September 2009. Then, a GCC-China economic forum followed this first round of talks in February 2010 in Bahrain. The GCC countries also initiated free trade talks with South Korea in 2008. The first round of free trade talks between India and GCC was held in March 2006, but the progress has been slow.

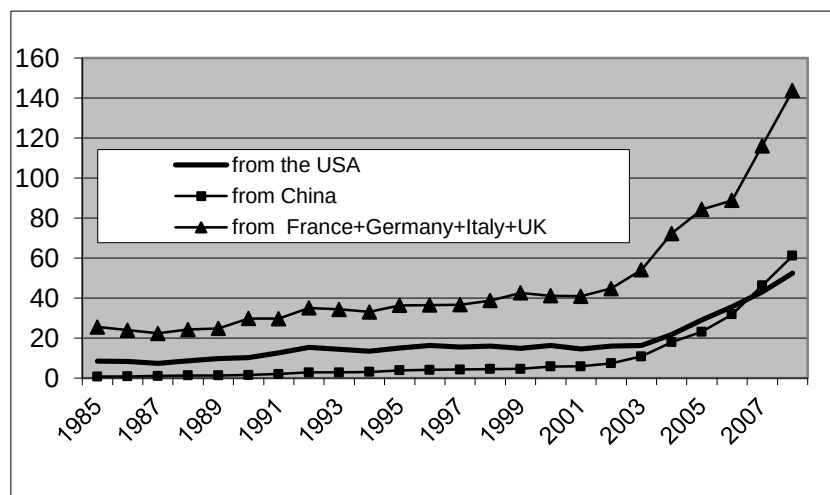
⁸ Arab countries included in this aggregate are: Algeria, Bahrain, Egypt, Iraq, Kuwait, Jordan, Libya, Lebanon, Morocco, Qatar, Yemen, Oman, Sudan, Syria, Saudi Arabia and, the UAE.

equipment accounted for 67% of the total merchandise imports of GCC countries in 2008 (United Nations Comtrade Database). Although GCC accounts for less than 12% of the total population in Arab world, its share of Arab imports has exceeded 50% since 1991. As a result, the GCC import market is very important for industrial countries. Arab imports from all of their major trade partners have increased sharply after 2000 as demonstrated in Graph 1-b.

Graph 1-a: Merchandise Imports of Arab Countries (billion \$)



Graph 1-b: Merchandise Imports of Arab Countries (billions \$)



Along with the sharp increase of imports in Arab countries, the relative market shares of leading exporters to these countries have changed. This study focuses on relative market shares of China, Japan, the United States, and aggregate imports from the four largest European economies, namely Germany, France, the UK, and Italy (henceforth known as EU4). In order to highlight the longer-term trends and ignore the volatile year-on-year fluctuations, the three-year average of annual market share data will be used instead of the annual data.

The most visible trend in import market shares during 1988-2008 is a gradual loss of market share in Arab countries for Europe, Japan, and the United States. During the same time, the market share of China increased visibly. This trend is a reflection of the emergence of China as the dominant global center for manufacturing since 1980. China has enjoyed a clear cost advantage in production and export of low and medium technology manufactured products. The United States, Western Europe, and Japan still dominate the global market in high-tech products but the range of products that can be produced in China at much lower cost than other industrial countries has steadily expanded over the past three decades.

The EU4's market share in GCC countries fell from 25% to 21% during 1988-2008 interval but it was not consistent among the member countries. While the EU4 market share declined sharply in Saudi Arabia, it enjoyed a moderate growth in the UAE and remained stable within a narrow range in Kuwait. Table 1 also allows the comparison of the EU4's market share performance in the Arab world with other developing regions. We notice that the EU4's loss of market share was not limited to the Arab world. The downtrend is visible in Africa and Latin America as well, and the relative decline in both markets is larger than in Arab countries. In Africa, for example, EU4's market share fell by 35% from 0.42 in 1988-90 to 0.27 in 2005-07.

Table 1: Combined Market Shares of Germany, France, Italy and the UK in Arab Countries (3-year averages of the annual market rates)

	1988-90	1991-93	1994-96	1997-99	1998-00	2002-04	2005-07
Saudi Arabia	0.27	0.28	0.26	0.24	0.23	0.22	0.21
UAE	0.25	0.25	0.26	0.24	0.28	0.32	0.28
Kuwait	0.23	0.27	0.27	0.23	0.23	0.26	0.22
GCC	0.25	0.26	0.25	0.24	0.24	0.23	0.21
Arab Countries (a)	0.32	0.32	0.31	0.30	0.30	0.29	0.24
Middle East	0.33	0.36	0.34	0.32	0.31	0.28	0.26
Latin America	0.14	0.13	0.13	0.12	0.11	0.10	0.09
Africa	0.42	0.40	0.37	0.35	0.35	0.33	0.27
Developing Countries	0.26	0.26	0.24	0.23	0.22	0.21	0.19

Source: Nominal import data from IMF Direction of Trade Statistics, market shares calculated by the Author a) Arab countries are: GCC countries, Algeria, Morocco, Libya, Egypt, Tunisia, Syria and Jordan

In the GCC market, the US market loss was moderately smaller than in the entire Arab region. The US share in GCC market fell from an average of 14.2% in 1988-2000 to 11.6% in 2002-2007. Among GCC countries, US has traditionally maintained strong economic ties with Saudi Arabia. However, the US market share in that country's import has also declined from 20% in 2000 to under 13% in 2008. The US market share in Kuwait's imports rose considerably after the first Gulf war (1990-91) in which a US led international coalition liberated Kuwait from Iraqi occupation. As demonstrated in Table 2 and Graph 2, the US market share in the Arab region (and in the Middle East) is larger than in Africa but smaller than in developing countries as a group. As we saw in Table 1, the opposite is true for EU4 countries.

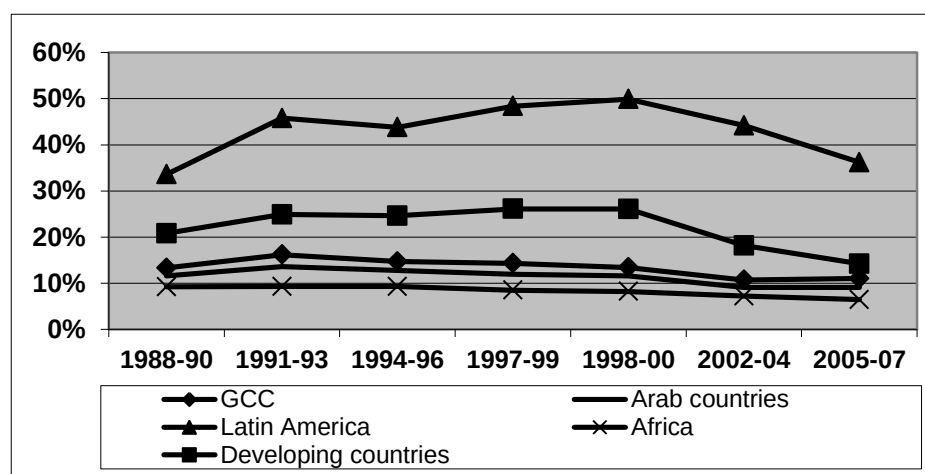
Graph 2: USA: 3-year average market shares in Developing Countries

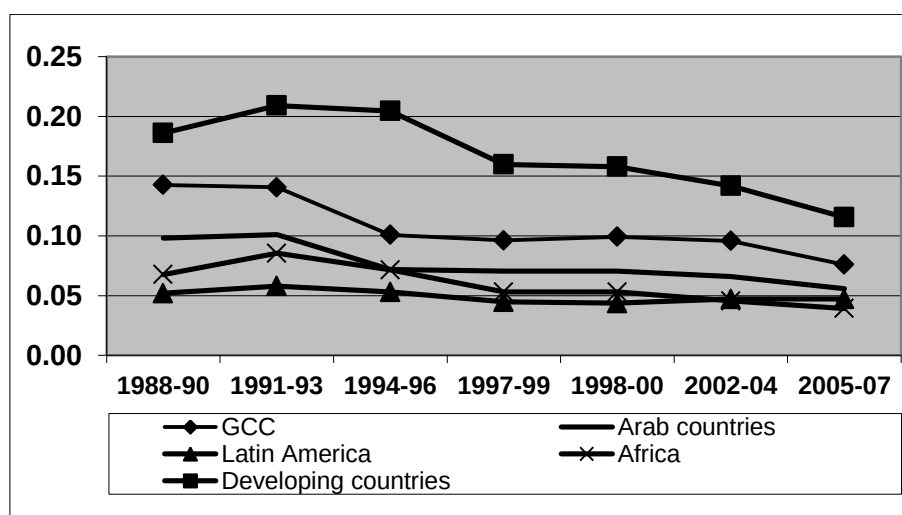
Table 2: Market Share of the United States in Arab Countries
(3-year averages of the annual market rates)

	1988-90	1991-93	1994-96	1997-99	1998-00	2002-04	2005-07
Saudi Arabia	0.17	0.21	0.22	0.21	0.20	0.16	0.13
UAE	0.09	0.09	0.09	0.10	0.09	0.07	0.10
Kuwait	0.12	0.22	0.16	0.14	0.13	0.13	0.14
GCC	0.13	0.16	0.15	0.14	0.13	0.11	0.11
Arab Countries (a)	0.12	0.14	0.13	0.12	0.12	0.09	0.09
Middle East	0.13	0.15	0.17	0.16	0.15	0.11	0.12
Latin America	0.34	0.46	0.44	0.48	0.50	0.44	0.36
Africa	0.09	0.09	0.09	0.08	0.08	0.07	0.06
Developing Countries	0.21	0.25	0.25	0.26	0.26	0.18	0.14

Source: Nominal import data from IMF Direction of Trade Statistics, market shares calculated by the Author
a) Arab countries are: GCC countries, Algeria, Morocco, Libya, Egypt, Tunisia, Syria and Jordan.

Another industrial country that has lost market share in the Arab world is Japan (Graph 3). On average, Japan's market share in Arab countries has been smaller than in other developing countries. In the GCC market, Japan's share fell from 14% to 8% between 1988 and 2007 in a pattern similar to the Arab world in general. Unlike the EU4 and the US, which experienced the largest decline in their market shares during 2000-2007, Japan's market share dropped mostly in the early 1990s when the Japanese currency, the yen, appreciated against the US dollar.

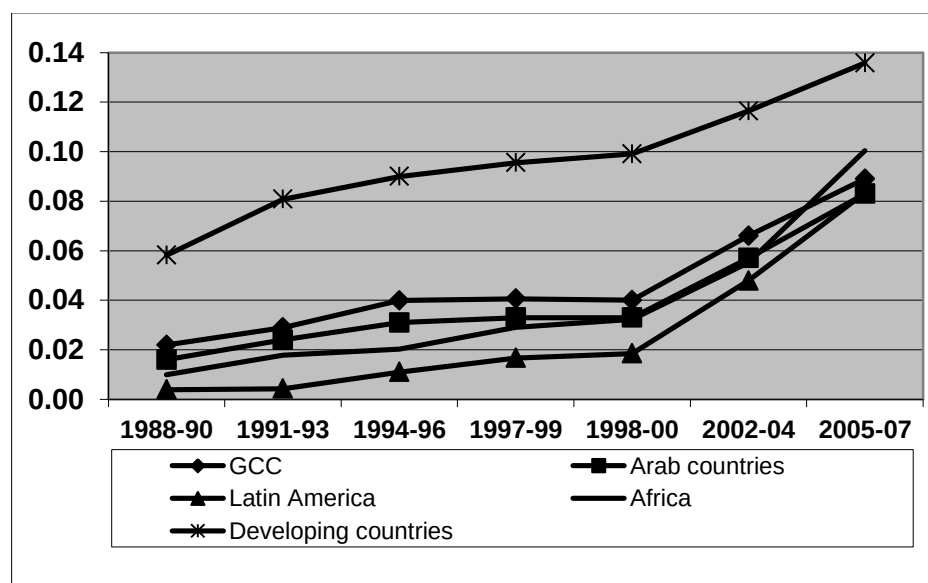
Graph 3: Japan: 3-year Average Market Shares in Developing Countries



In contrast to the United States and the European countries, China has seen its market share increase in the Arab world during the past two decades (Graph 4). While China's market share in the Arab countries is significantly smaller than those of Europe (the EU4) and the United States, it has enjoyed a considerable growth in recent years. Starting from a negligible share of fewer than 2% in 1988-1990, China's share grew slowly to 3% by 1998-2000. This, however, was followed by much faster growth during 2000-2007, which increased China's share to an average of 8% during 2005-07.

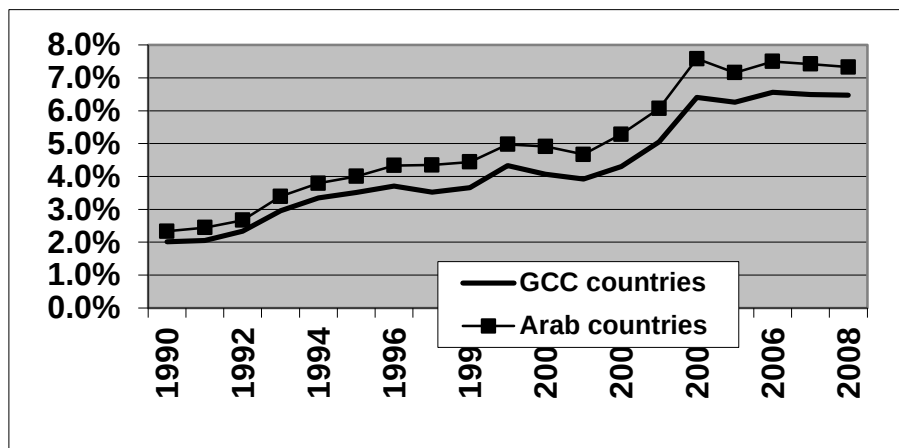
The rapid increase in China's exports to the GCC countries caused most of this growth, particularly the UAE, which has emerged as a major processing and re-export center for the Middle East and Central Asia. China's exports were mostly dominated by consumer electronics, textiles, steel and machinery. China enjoys an advantage in exports of these products because of its low labor costs. However, in more recent years, China has diversified the range of its export products and has moved into more sophisticated hi-tech export markets. Accordingly the composition of its exports to GCC countries is moving in this direction and posing a more direct competition to export products of the United States, Japan, and Western Europe.

Graph 4: China: 3-year Average Market Shares in Developing Countries



The market share changes discussed above also reveal that the Arab import market has become more diversified over time. The combined exports of the EU4, Japan, China, and the US accounted for 56% of total imports of Arab countries in 1988-90 but it declined to 47% during 2005-07, indicating an increase in the market shares of other countries such as India. The market share of India in GCC imports grew from 2% in 1990 to 7% in 2002 as shown in Graph 5.

Graph 5: India's Share in Merchandise Imports of Arab Countries



3. Review of Literature on Determinants of Import Share

Bilateral trade relations among nations attract the attention of economists and political scientists alike. Most economic analysis of international trade concerns itself with total volume of imports and exports and how they affect the domestic macroeconomic conditions. The earliest economic model of international trade to differentiate between products based on their countries of origin, and thus pave the way for analysis of country import shares, was Armington (1969). According to the Armington model an importing country first allocates its total expenditure between domestic goods and imports. Once it decides on the aggregate level of imports, if there are several national suppliers for an import product, it decides on how much to buy from each national supplier and hence the market share of each supplier is determined.

In another empirical study, Parikh (1988) focused on import shares of leading trade partners for the United States, Japan, and the European Economic Community (EEC). He derived his import share model from an Almost Ideal Demand System (AIDS)⁹. In his model, the import share of country *i* in country *j* is a function of the real value of aggregate imports of *j* and the export price indexes of all the countries that export to *j*.

In empirical trade studies, economists consider the income level of the importing country and the relative price of exports from various countries as the key determinants of the volume of imports by a country from its trade partners. Political scientists have generally tried to investigate the impact of diplomatic relations on trade by adding appropriate dummy variables to these standard models of trade. Using this approach, two early empirical works by Kunimoto (1977) and Nagy (1983) showed that warmer diplomatic relations between two nations led to expansion of bilateral trade. Three other empirical studies in the early 1980s considered the impact of bilateral conflict on trade and vice versa. Polachek (1980), Gasiorowski and Polachek (1982), and Arad and Hirsch (1983) use a rational choice model as the basis for a number of empirical studies, which demonstrated that rational actors (nations) will avoid conflict with their trade partners.

Building on these earlier empirical works, Pollins (1989) used a pooled cross-section time-series econometric model to investigate the impact of bilateral diplomatic relations on imports. Pollins' empirical results showed that diplomatic relations have a significant correlation with volume of trade and warmer diplomatic relations is associated with larger volumes of bilateral trade. In a more recent study, Pollins et al. (2010) offered more recent empirical evidence that political tension and conflict have an adverse effect on bilateral trade.

Several more recent studies also demonstrated the impact of non-economic factors on trade relations among nations. Summary (1989) demonstrated that the United States traded more with countries that were regarded as politically friendly. In another extension of Pollins' analysis, Morrow et al. (1998) focused on the direct and indirect impact of conflict on trade. Using long-term international trade data among major

⁹ For a detailed analysis of AIDS model see Deaton and Muellbauer (1980).

powers, they showed that when nations are locked in a conflict short of war, their bilateral trade declines. Finally, several marketing studies in the past two decades used interview survey analysis to corroborate that when consumers in one country harbor feelings of animosity and resentment toward another country, they avoided the products of that country, Klein et al. (1998).

While the empirical studies listed above concentrated on advanced economies, there is also a small body of literature dealing with the role of non-economic factors in trade behavior of developing and (former) communist countries. An investigation on trade behavior of communist countries was conducted by Lim and Kim (2002) with focus on North Korea's trade with China and the (former) Soviet Union. This study revealed that while the aggregate imports of North Korea from these two communist rivals was not sensitive to diplomatic relations, its purchases of some basic commodities from one or the other was highly sensitive to these factors.

4. Theory and Statistical Model

This section will present the theoretical argument for the estimation model that will be used to investigate the determinants of import market shares. This model was initially developed by Parikh (1988). In his analysis of import demand shares, Parikh derived his import share equations from an Almost Ideal Demand System (AIDS). The AIDS model is suitable for our analysis because it allows us to formulate each exporting country's market share as a function of the real value of the importing country's aggregate imports and the export prices of major competitors. The import demand equations in AIDS are derived from an indirect utility function as described in equation one.

$$(1) \quad \text{Log } c(\mu, \mathbf{P}) = \alpha_0 + \sum_k \alpha_k \log P_k + \frac{1}{2} \sum_k \sum_i \gamma_{ki}^* \log P_k \log P_i + \mu \beta_0 \prod_k P_k^{\beta_k}$$

Where $c(\mu, \mathbf{P})$ = the cost of achieving the utility level (μ) for the given level of export prices ($P_1, P_2, \dots, P_n$). Here $\mathbf{P}_i$ represents the price level of exporting country i (i.e. relative exchange rate). By taking the derivative of equation 1 with respect to $\log \mathbf{P}_i$ we can derive the market share demand for each exporter:

$$(2) \quad \frac{\partial \log c(u, \mathbf{P})}{\partial \log P_i} = a_i$$

$$(3) \quad a_i = \alpha_i + \sum_k \gamma_{ik} \log P_k + \beta_i \mu \beta_0 \prod_k P_k^{\beta_k}$$

Equation 3 gives the import share as a function of the importing country's utility level and all export prices. To introduce the import level into equation 3, Parikh notes that for a utility maximizing importer, the cost of imports (M) needed to achieve the utility level μ at a given price level $\mathbf{P}$ is $M = c(\mu, \mathbf{P})$. This equation can be solved for μ as a function of M and $\mathbf{P}$. After substituting for μ in equation 3 and simplifying the result, we get the import share demand function for each importing country j from country i in equation 4.

$$(4) \quad \alpha_i^j = \alpha_i^j + \sum_k \gamma_{ik}^j \log P_k^j + \beta_i^j \log\left(\frac{M}{P}\right)^j$$

This equation proves very practical for estimating the import share equation. The relative exchange rates can be used as substitutes for the export prices. The data for nominal level of aggregate imports and price levels are readily available for the Arab (importing) countries. We can add appropriate dummy variables to this equation for the non-economic factors that we anticipate to have an impact on the market share of each exporter.

The empirical investigation in this study will focus on import shares in six Arab countries of the GCC (Bahrain, Kuwait, Oman, Qatar, UAE and Saudi Arabia), plus two regional import aggregates, one for GCC as a bloc and another for the combined imports of 13 Arab countries. The dependent variable for each importing country is the import share of one of its partners. For sake of consistency, the four exporters that were discussed in the trend analysis section will also be included in this section: the United States, the EU4, Japan and China. In addition, some regression models will be repeated for the aggregate market share of Japan, China, India, and South Korea as a single exporting block labeled Asia4.

The annual bilateral import-export data for this analysis is obtained from the IMF Direction of Trade (DOT) Statistics¹⁰ with the maximum data range of (1969-2008). The DOT data is ideal for multi country analysis because all trade data is reported in the US dollar. In some cases, the volume of bilateral trade reported by an exporting country differs from what the importing trade partner reports. In these cases, the data reported by the export partner will be used in order to maintain consistency.

Independent variables: The right hand side variables of each regression model include two economic variables, an appropriate exchange rate and the real value of aggregate imports. A number of dummy variables for major political and geopolitical events are also added to the right hand side. Since all six GCC countries pegged their currencies to the US dollar for the entire time interval under consideration, the dollar/euro exchange rate and the dollar/yen exchange rate are used as proxies for the national currency exchange rates. For example, the dollar/euro exchange rate will reflect the relative price competitiveness of the US (and Chinese) exports versus the European exports (the Chinese currency is also closely pegged to the US dollar.)

Several dummy variables for specific time intervals that are associated with important geopolitical events in the Arab world are introduced in the statistical analysis. The US-Arab relations primarily motivate the choice of events, with a focus on events that have had a lasting and significant impact on bilateral relations (Table 5). Two major events that highlight this significant impact on bilateral relations are the Gulf War I (the liberation of Kuwait) and Gulf War II (the occupation of Iraq). First, the GCC and other moderate Arab countries generally perceived the role of the United States in the first Gulf War, which led to the liberation of Kuwait from Iraqi occupation, as a positive intervention. On the contrary, the US invasion of Iraq in 2003 faced strong public opposition by most Arab governments and subsequently contributed to the rise of anti-American sentiments throughout the region. For the purposes of this study the time span of this variable ranges from 2003 to 2004. The US market share in GCC countries rose by 3.7% in 1991 but declined by 0.8% and 1.6% in 2003 and 2004 respectively.

¹⁰ For more information about this data base visit
<http://www2.imfstatistics.org/DOT/help/DOThelp.htm>

I have also included a dummy variable for years 2001 and 2002 to capture the impact of the second Palestinian Intifada¹¹ (uprising) and the September 11th terrorist attacks. The second Intifada, which began in September 2000, led to a surge in anti-American sentiments in the Arab World. Soon after the second intifada, the September 2001 attacks on the World Trade Center occurred; and this event even precipitated further tensions between the United States and Arab countries. Since a short time interval exists between these two events, they are combined into a single dummy variable entitled Intifada-September11, which covers the years 2001 and 2002.

¹¹ The first Palestinian Intifada began in December 1987 and continued until 1993. The second Palestinian Intifada began in September 2000, but there are disagreements about when it ended. Some argue that it ended in 2004, while others believe it lasted till 2005.

Table 5: Important Events in US-Arab Relations

Change in the market share of	Gulf War I (Kuwait) 1990-91				Second Intifada & September 11 2001-02			Gulf War II (Iraq) 2003-04		
	1990	1991	1992		2000	2001	2002	2003	2004	2005
USA in Saudi Arabia	-1.5%	3.5%	2.3%		0.1%	-1.2%	-1.5%	-1.3%	0.3%	-0.5%
EU4 in Saudi Arabia	0.9%	0.4%	0.3%		-1.2%	0.1%	-0.3%	0.1%	-1.8%	-0.5%
EU2 in Saudi Arabia	0.8%	0.0%	0.3%		-1.8%	0.3%	-1.1%	0.0%	-0.3%	-1.0%
USA in GCC	-1.0%	3.7%	0.2%		0.6%	-0.5%	-0.6%	-0.8%	-1.6%	1.8%
EU4 in GCC	0.8%	-0.6%	0.7%		0.2%	-0.3%	0.1%	-0.5%	-0.1%	-0.4%
EU2 in GCC	0.8%	-0.3%	0.0%		-1.8%	0.3%	-1.1%	0.0%	-0.3%	-1.0%
USA in Arab (total)	-1.1%	2.1%	0.5%		1.0%	-1.3%	-0.1%	-1.4%	-0.9%	1.0%
EU4 in Arab (total)	1.7%	-1.6%	0.2%		-1.3%	-0.2%	-0.5%	0.5%	-2.9%	-0.5%
EU2 in Arab (total)	1.9%	-1.7%	0.6%		-0.9%	0.1%	-0.5%	1.1%	-1.7%	-1.1%

Notes: EU4: Aggregate market share of France, Germany, Italy, and the UK.

EU2: Aggregate market share of France and Germany. These two countries were the leaders of European opposition to the US occupation of Iraq in 2003.

All import values were converted to real values before calculating the trade shares for regression analysis. This conversion helps prevent the results of the analysis from being distorted by the differences in inflation rates in exporting countries during the time span of the data. For each of the nine exporting countries, an appropriate export price index was used for calculating the real value of their exports to GCC countries after adjustment for price changes. For some countries, a direct export price index was not available, and therefore, close proxies were used as described in Table 3. In order to convert the total imports of each importing country from nominal to real values, it was necessary to construct a weighted export price index based on the export price indexes of the nine exporting countries in the sample. The lack of an historical export index data for some countries reduced the data range for real values to only 28 annual observations after 1980.

Table 6: Source of data for Export Price Indexes

US: Bureau of Economic Analysis (Export-Goods Price Index, Table 1.1.4)
Italy, UK, Germany (IMF: Export unit value Index)
Japan: Bank of Japan (Export Price Index)
China: National Bureau of Statistics (Producer Price Index of Manufactured Goods)
France: National Income Accounts (Ratio of nominal to real values of Exports of Goods)
India: IMF (Export Prices, L74&D)
Korea: IMF (Export Prices, L76)

For an importing country, the market shares of its trade partners are interconnected because the market shares for all partners add up to one and an increase in one partner's share reduces the market shares of all others. Because of this property using the Seemingly Unrelated Regression (SUR) method is more efficient than running independent OLS regressions. To take advantage of this additional efficiency, this analysis uses the SUR model.

A separate SUR model is estimated for each importing country, and each SUR model will have one equation for each export partner under consideration. The nine exporting countries in the sample accounted for nearly 50% of the total imports of each importing country. We consider the rest of the world as the residual trade share that will not be directly estimated.

To ensure that the trade share time series are stationary, the Multivariate Dickey-Fuller test for seemingly unrelated equations¹² was performed (Table 7). The results in Table 7 suggest that, with the exception of Bahrain and Qatar, the market share variables were non-stationary at the level but became stationary after conversion to first difference. In light of this result, the first difference of all the dependent and independent variables are used in the regression estimates instead of the level values.

Table 7: Multivariate Dickey-Fuller test for Seemingly Unrelated Equations (Four Equations for market shares of USA, EU4, Japan & China)

	Level		First Difference	
	Test value	5% Critical Value (No. of Observations)	Test Value	5% Critical Value (No. of Observations)
Bahrain	33.226	28.15 (28)	79.953	28.894 (27)
Kuwait	17.937	28.15 (28)	79.491	28.894 (27)
Oman	22.287	28.15 (28)	75.384	28.894 (27)
Qatar	30.921	28.15 (28)	164.745	28.894 (27)
Saudi Arabia	8.329	28.15 (28)	46.156	28.894 (27)
UAE	11.818	28.15 (28)	93.898	28.894 (27)
GCC	14.919	28.15 (28)	56.128	28.894 (27)
Arab13	19.631	31.844(24)	53.232	33.168 (23)

Data range: (1980-2007);

(Arab13: GCC countries, Morocco, Libya, Egypt, Tunisia, Algeria, Syria, Jordan)

Market shares are based on import values in constant prices.

5. Estimation Results

For each importing country, the SUR model is estimated using the first-difference log equation of the import share model that was described above. The SUR model does not require all equations to have the same set of right hand side variables. As a result and instead of using the

¹² This test was conducted in Stata (econometric software) using the MADFULLER command. Multivariate Augmented Dickey-Fuller is a panel unit root test that is suitable for seemingly unrelated regression (SUR) models. The null hypothesis of this test is that all the time series in the panel are non-stationary. Therefore, the null hypothesis will be rejected even if one time series is stationary. For more details see Taylor M.P. and Sarno L. (1998).

same exchange rate in all equations, the equation of each exporting country includes its own appropriate exchange rate. In this section, the results are grouped by exporting country. Hence each equation that appears in the table below originates from the SUR model of the corresponding importing country. Table 8 shows the results for the United States and only a handful of the variables have significant coefficients. Even the dollar/euro exchange rate does not have a significant coefficient in any of the equations.

Nevertheless, Table 8 reveals that in several GCC countries the coefficient of dummy variables is significant and shows the expected signs. The dummy for the Gulf war I (liberation of Kuwait) has a positive and significant coefficient for US market share in Kuwait, Saudi Arabia, the GCC block, and the aggregate imports of Arab countries. As mentioned earlier, the ruling regimes in GCC countries were generally supportive of the US-led war that liberated Kuwait from Iraqi occupation, and this positive image might have contributed to the growth of the US market share in GCC. The dummy variable for the 2003-04 Iraq war has a negative coefficient in all countries except Kuwait, but its coefficient is only significant in Oman, the GCC bloc, and the aggregate Arab market. The dummy variable for the second Intifada/September 11 does not have a significant coefficient in any of the equations.

Tables similar to Table 8 were constructed for China, Japan, and the EU4. Rather than presenting all of these tables here, the results for coefficients of the dummy variables are summarized in Table 9. This table only reports the coefficients that were statistically significant for each trade partner of an importing country. In some cases, the coefficient was significant; however, it appears from an equation with a p-value of larger or equal to 0.1, which weakens the significance of the result.

Table 8: Model specification: (First-Difference log equations)
 Dependent variable: Market share of the United States in each country.
 Equations extracted from each importing country's SUR model estimations.

USA	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	GCC	Arab 13
Total Imports	0.532	-0.5	0.391	0.0887	0.516	0.273	0.267	0.229
	0.228	0.021**	0.139	0.634	0.595	0.133	0.053*	0.137
Exchange Rate \$/euro	-0.199	0.297	0.0656	0.446	-0.047	-0.32	-0.051	0.00772
	0.642	0.379	0.814	0.19	0.671	0.164	0.679	0.954
Dummy 2001-02	-0.012	0.0996	0.0688	0.0924	-0.0495	-0.0142	-0.0366	-0.0679
(Intifada, September 11)	0.949	0.504	0.544	0.524	0.292	0.88	0.486	0.164
Dummy 2003-04	-0.298	0.0864	-0.223	-0.23	-0.00578	-0.184	-0.15	-0.16
(Iraq war II)	0.13	0.59	0.068*	0.134	0.91	0.11	0.018**	0.008**
Dummy 1991-92	0.215	0.489	-0.202	0.0673	0.152	-0.0601	0.0963	0.091
(Gulf War 1, Kuwait)	0.247	0.002**	0.082*	0.642	0.002**	0.541	0.091*	0.07*
Dummy 1998-99	0.114	-0.0286	-0.11	0.0219	-0.0666	-0.232	-0.129	-0.0867
(Asian Financial Crisis)	0.548	0.846	0.343	0.881	0.155	0.022**	0.015**	0.08
Observations	28	28	28	28	28	28	28	25
"R-squared"	0.197	0.295	0.251	0.13	0.373	0.23	0.423	0.411
p-value	0.33	0.0611	0.156	0.604	0.011	0.217	0.0022	0.0079

Data range: (1980-2007); (Arab13: GCC countries, Morocco, Libya, Egypt, Tunisia, Algeria, Syria, Jordan)

Market shares are based on import values in constant prices.

Table 9: Direction of Change for Significant Coefficients in the SUR Model with Difference-Log Equations

Four European Count. (EU4) United States (USA)China (CH) Japan (JAP)	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	GCC	Arab (13 countries)
Dummy 2001-02 (Intifada, September 11)								
Dummy 2003-04 (Iraq war II)	JA EU4		EU4 US			JAP	US	
Dummy 1991-92 (Gulf War I, Kuwait)	EU4 CH	<u>EU4</u> , US	JA US	EU4	US	JAP	US, JAP	
Dummy 1998-99 (Asian Financial Crisis)					JAP	<u>US</u> CH		

Upper: A Positive and Significant Coefficient, ($\alpha < 0.1$)

Lower: A Negative and Significant Coefficient ($\alpha < 0.1$)

Underlined abbreviations: The Coefficient is significant but it comes from an equation that is not statistically significant.

EU4: France, Germany, Italy, UK

The numbers in Table 9 offer some consistent but weak results regarding the impact of the geopolitical developments on the US market shares. The 2003-04 Iraq war shows a negative correlation with the US market share in the GCC, which is particularly significant in Oman. The Gulf war I dummy has a positive correlation with the US market share in Kuwait, Saudi Arabia, and the GCC. At the same time, the Intifada/September 11 dummy has no significance for any exporting country in any of the models. Similarly, no dummy variable proves significant for the aggregate imports of the 13 Arab countries.

In order to examine the robustness of results that have been reported in Table 9, the statistical analysis is repeated with several other groupings of the exporting countries in the sample. One grouping that offered more significant results was the aggregation of four Asian exporters (China, Japan, India and South Korea) into a single export bloc that's entitled ASIA4. Each importing country's SUR model now had three equations for the US, the EU4, and the Asia4. These models were estimated with the same set of independent variables that were reported in Table 5 with first difference-log values and simple first difference values. Furthermore, annual market share data was converted into three-year moving averages. The estimated equations based on moving average data generated better results. The results were very similar to estimations based on annual data in terms of the sign and significance of the coefficients, but the coefficient t-statistics were larger in the first-difference model. The summary of the coefficients of the dummy variables with the first-difference model appear in Table 10.

Table 10: Direction of Change for Significant Coefficients in the SUR models with First-difference Equations based on 3-year Averages of the Market Shares (the three-equation SUR model)

1) Four European Count. (EU4) 2) United States (USA) 3) Asia (ASIA4)	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE	GCC	Arab 13
Dummy 2001-02 (Intifada, September 11)	USA				ASIA4 USA	ASIA4 USA	ASIA4	USA
Dummy 2003-04 (Iraq war II)	ASIA4	ASIA4	EU4		ASIA4	ASIA4	ASIA4	ASIA4, EU4
Dummy 1991-92 (Gulf War I, Kuwait)	USA ASIA4	<u>USA</u> ASIA4		USA	USA ASIA4		USA	USA
Dummy 1998-99 (Asian Financial Crisis)	USA	ASIA4				<u>ASIA4</u>		

Upper: A Positive and Significant Coefficient,

Lower: A Negative and Significant Coefficient (significance level: 0.1)

Underlined abbreviations: The Coefficient is significant but it comes from an equation that is not statistically significant.

Asia4: China, Japan, India, Korea, EU4: France, Germany, Italy, UK

The coefficient signs in Table 10 point to more consistent and stronger results regarding the impact of each dummy variable on relative market shares of the three exporting regions. The results for the Intifada/September 11 dummy variable show that this event was associated with lower market shares for the United States in three GCC countries as well as the aggregate imports of the Arab world. Asian exporters, on the other hand, gained market share during the two years associated with this period. This result is consistent with the deteriorating diplomatic relations between the US and the Arab countries during this period. While Table 10 does not show a significant market share loss for the United States in association with the 2003-04 dummy variable (the Iraq war), it does show positive and significant correlations (market share gains) for the European and Asian countries. The market share gain of Asian countries is primarily driven by the growth of China's market share and can be part of a longer trend that began in 2001. The European market gain, however, can be attributed to geopolitical concerns of the Arab importers. Three members of the EU4- namely France, Germany and Italy- expressed strong opposition to the US invasion of Iraq, while the UK was supportive.

The dummy variable for Gulf War I shows a significant positive association with the US market share for both the GCC countries and the aggregate imports of the Arab countries. Within the GCC countries, the US market share has a significant positive association with this dummy variable in the Kuwait, Qatar, Saudi Arabia, and Bahrain models. The GCC countries rely on the United States for their external security, and the swift US response to the Iraqi occupation of Kuwait was a welcomed development that might have encouraged more imports from the U.S.¹³

¹³ The improved image of the United States in GCC countries and its impact on US exports to these countries was noticed by a Clinton Administration official in 1993 who said: "In the wake of Desert Storm, the end of the Cold War, and our role in the Arab-Israeli peace process, many US firms are finding Near East markets more receptive to American products. This is particularly true in the Gulf, where both the public and private sectors are increasingly inclined to "buy American.""

Source: US economic policy in the Middle East: challenges and opportunities - Assistant Secretary for Near East Affairs Edward P. Djerejian speech October 4, 1993, US Department of State Dispatch , http://findarticles.com/p/articles/mi_m1584/is_n40_v4/ai_14642129/pg_5/?tag=content;col1 , date cited December 2010.

As a final experiment, a new dummy variable for the 2005-08 interval was added to the first-difference SUR models of Table 10. . This variable covers an interval that is associated with the record high price of oil and the corresponding record high oil revenues for GCC countries. These high revenues led to a sharp increase in Arab imports of merchandise goods (Graph 1). The results were consistent with the earlier results in Table 10. The dummy variable for 2005-08 time interval was positively associated with the market share of the Asia4 countries in GCC and the entire Arab world (Arab13). Furthermore, the inclusion of this additional variable increased the explanatory power of the model and increased the number of variables with significant coefficients.

6. Conclusion

In light of the growing significance of the Arab import market for the global economy, this study focused on how major geopolitical events influenced the market shares of leading exporters to the GCC markets. Empirical studies in several social science disciplines have found that while economic factors are the main determinants of bilateral trade relations between two nations, diplomatic relations and sentiments of each country's population toward the other, also have an influence. As the statistical analysis of this study has demonstrated, the ups and downs of the US –Arab relations had a visible impact on trade relations between the two sides.

With regard to the GCC countries, two important geopolitical factors are expected to influence trade relations: the US role in the Arab-Israeli conflict and the special security arrangement that each GCC government has developed with the United States to protect itself and its oil assets against internal and international threats. On the one hand, the United States expects favorable trade and investment relations with GCC countries in return for the security and protection that it extends to the countries and the ruling regimes.

On the other hand, the US support for Israel adversely impacts US relations with GCC countries. The GCC ruling regimes that maintain close ties with the US face domestic political pressure to cut back their economic and diplomatic ties as a show of solidarity with the Palestinians. While they have not resorted to an oil embargo for this

purpose, ever since 1973, their purchase of American products is expectantly impacted by this factor.

The empirical analysis in this study offers a number of insights into the sensitivity of GCC imports in relation to the Middle East policies of the exporting countries. The strongest results obtained are first, the United States' lost market share in several GCC and other Arab countries in the years immediately following the second Palestinian Intifada and the September 11 terrorist attacks. Second, the United States' gained market share in GCC countries after it drove Iraq out of Kuwait. Both of these findings indicate that US foreign policy in the Middle East has an impact on its trade relations with the GCC. In other words, the identity and foreign policy of trade partners matter to Arab importers and consumers.

The findings also lead to two more specific results on this issue. The reaction of GCC countries to geopolitical events is not fully coordinated and depends on each country's unique diplomatic and strategic relation with its trade partners. For example, after the liberation of Kuwait in 1991, the US gained market share in four GCC countries but not in Oman and the UAE. Similarly, after the second Intifada and September 11 attacks, the US lost market shares in Bahrain, Saudi Arabia, and the UAE but not in Kuwait, Oman, and Qatar. These findings are not surprising. While GCC countries have been successful in internal economic cooperation, they remain weak in coordination of their foreign trade policies, particularly towards the United States. Bahrain, for example, signed a free trade agreement with the United States despite Saudi objections to some aspects of this agreement. As a result of this weak coordination, the GCC countries cannot use their collective economic power as a diplomatic weapon.

Statistical analysis also reveals that in cases such as the intifada and September 11, where a significant adverse impact on US market share occurred; the relative magnitude of this market share loss was rather small. This observation suggests that although people and governments of GCC countries express strong sympathy for Palestinians, the amount of trade and economic sacrifice that they are willing to make for this cause is rather limited. This limited sacrifice, perhaps, results from the importance of the United States for their security and/or a realization that they cannot influence the US policy through economic and trade

incentives. Overall, since US engagement in the Arab world in general and the GCC countries in particular, is likely to continue for the foreseeable future; these questions deserve further empirical and institutional analysis.

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Efficiency of Islamic Banks: A Comparative Analysis of MENA and Asian Countries

Abdul Rahim Abdul Rahman and Romzie Rosman

It is crucial for Islamic banks to be efficient in order to withstand competitive pressures and financial crises. This study empirically examines and compares the efficiency of selected Islamic banks in Middle Eastern and North African (MENA) countries (including Gulf Cooperation Countries) and Asian countries. The efficiency scores were measured using data envelopment analysis based on the intermediation approach. The sample was comprised of 63 Islamic banks, focusing on performance for a four year period (2006 to 2009).

The study finds that the main source of technical inefficiency among the Islamic banks is the scale of their operations. The Islamic banks, in general, achieved a high score for pure technical efficiency, indicating that the banks' management were able to efficiently control costs and use the inputs to maximise the outputs regardless of scale effects. On average, Islamic banks from Asian countries are found to be relatively more efficient than those in MENA countries. Interestingly, most of the efficient Islamic banks were from Gulf Cooperation Countries. The economic condition of a country is found to be the main determinant of an Islamic bank's efficiency.

Introduction

The recent global financial crisis brought the Islamic financial industry into the spotlight as a possible alternative for investment and banking (Smola and Mirakhor, 2010). Islamic financial institutions have a relatively high market share in several emerging markets, such as Malaysia and several Middle Eastern countries (Beck et al., 2013). Islamic banking is recognised as one of the fastest growing areas in finance and has grown all over the world. The number of Islamic financial institutions worldwide has risen to over 300 in more than 75 countries concentrated mainly in the Middle East and South East Asia

(Sufian and Noor, 2009). Countries like Malaysia and Bahrain are striving to be regional hubs for Islamic financial services (Ariss, 2010).

Despite the rapid growth of the Islamic banking and finance industry, analysis of Islamic banking at a cross-country level is still in its infancy (Sufian and Noor, 2009). Furthermore, cross-country analysis – in particular of MENA and Asian countries – is important as most of the well-established Islamic banks are operating in these countries.

The aim of this study is to fill the gap in the literature by providing empirical evidence on the efficiency of Islamic banks in MENA and Asian countries during the period 2006 to 2009. Interestingly, the study period includes the occurrence of the financial crisis of 2007/2008 following the subprime meltdown in the United States, which affected the global financial system including Islamic banks that work side-by-side with the conventional banks.

Review of the Literature

Extensive studies have been conducted on bank efficiency, with most focusing especially on geographical regions and individual countries. Many studies have focused on the US (see, for example: Aly et al., 1990; Spong et al., 1995) and on European countries (see, for example: Favero and Papi, 1995; Pasiouras, 2008b). Other studies have focused on the banking industry in Middle Eastern countries, for example, in Turkey (see, for example, Isik and Hassan, 2002a and 2002b), Kuwait (see, for example, Darrat et al., 2002) and Jordan (see, for example, Maghyreh, 2004); countries in Asia, for instance, Malaysia (Omar et al., 2006; Mohd. Tahir et al., 2009), China (Ariff and Can, 2008; Avkiran, 2011) and India (Sathye, 2003); and in Oceania, such as Australia (see, for example, Sathye, 2001; Sturm and Williams, 2004).

Moreover, there are many studies that have conducted cross-country efficiency analyses, for instance, the work of Berg et al. (1993), Allen and Rai (1996), Hassan et al. (2000), Dietsch and Lozano-Vivas (2000), Chaffai et al. (2001), Mostafa (2009), Pasiouras (2008a) and Sun and Chang (2011). However, only a few studies have focused particularly on the Islamic banks (see, for example: Hassan and Hussein, 2003; Yudistira, 2004; Hassan, 2006; Sufian, 2006, 2007; Ahmad Mokhtar et al., 2008).

The study by Hassan and Hussein (2003) investigated the efficiency of the banking industry in Sudan by employing a panel of 17 banks for the period 1992 to 2000. The study employed a variety of parametric measures to assess cost and profit efficiency, and non-parametric data envelopment analysis (DEA) to estimate cost, allocative, technical, pure technical and scale efficiency. The results showed the Sudanese banking system exhibited 37 percent allocative efficiency and 60 percent technical efficiency, suggesting that the overall cost inefficiency of the Sudanese Islamic banks was mainly due to technical (managerial-related) rather than allocative (regulatory) factors.

In a cross-country analysis of the Islamic banks, Yudistira (2004) investigated the performance of 18 Islamic banks from 1997 to 2000 using a non-parametric approach. The banks were selected from among Gulf Cooperation Countries (GCC), East Asian, African and Middle Eastern countries. In the study, DEA was utilised to analyse the technical and scale efficiencies of the Islamic banks. The results suggested that the Islamic banks experienced slight inefficiencies during the global crisis of 1998/1999. The inefficiencies were related to pure technical inefficiency rather than scale inefficiency. The study also suggested that efficiency differences across the sample data appeared to be mainly determined by country-specific factors.

Hassan (2006) investigated the relative efficiency of the Islamic banking industry by analysing a panel of 43 Islamic banks in 21 countries during the period 1995 to 2001. Based on the parametric analysis to measure cost and profit efficiency, and non-parametric DEA to estimate cost, allocative, technical and scale efficiency, the findings showed that, on average, the Islamic banks were relatively less efficient compared to their conventional counterparts in other parts of the world. The results also showed that the main source of inefficiency was allocative inefficiency rather than technical inefficiency, and that the main source of technical inefficiency for the Islamic banks was not pure technical inefficiency but scale inefficiency.

Sufian (2006, 2007) investigated the performance of the Malaysian Islamic banking sector during the period 2001 to 2005 by utilising DEA. The findings suggested that the scale inefficiency dominated pure technical inefficiency in the Malaysian Islamic banking sector.

In addition, the domestic Islamic banks were more efficient compared to the foreign Islamic banks, albeit marginally.

Finally, Ahmad Mokhtar et al. (2008) studied the efficiency and competitiveness of the Islamic banks in Malaysia considering both fully-fledged Islamic banks as well as Islamic windows of the conventional banks in Malaysia. The study measured the technical and cost efficiencies using DEA. The findings showed that the efficiency of the Islamic banking industry overall increased during the period 1997 to 2003. The study revealed that the fully-fledged Islamic banks were more efficient than the Islamic windows, but they were still less efficient than conventional banks. They also found that the Islamic windows of the foreign banks were more efficient than the Islamic windows of the domestic banks.

Research Methodology

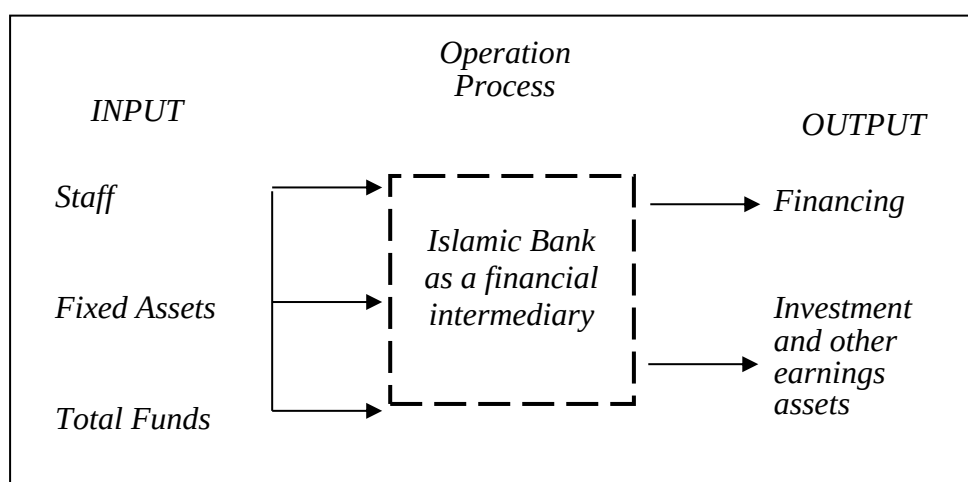
This study uses the common non-parametric approach of DEA which is widely used in efficiency analysis (see, for example: Aly et al., 1990; English et al., 1993; Favero and Papi, 1995; Katib, 1999; Drake and Hall, 2003; Sturm and Williams, 2004). Ahmad Mokhtar et al. (2006a) reviewed 47 bank efficiency studies and found that DEA was the most widely used estimation technique to measure the banks' efficiency, especially technical efficiency.

This study uses input-based orientation measures. Importantly, the reason for using input-based oriented measures is because of the fact that cost control is one of the banks' objectives. Input orientation aims to minimise inputs while satisfying at least the given output levels and output orientation attempts to maximise outputs without requiring more of any of the observed input values (Cooper et al., 2000). A few studies have used input-oriented measures (see, for example: Aly et al., 1990; Ferrier and Lovel, 1990; Furukawa, 1995; Zaim, 1995; Miller and Noulas, 1996; Resti, 1997; Bauer et al., 1998). Input orientation is also chosen in most studies since banks, in general, have no direct control over the amount of services required by their customers (Schaffnit et al., 1997). Moreover, the input and output-orientated measures identify the same frontier; therefore, the same set of banks would be identified as being the most efficient or best practice banks.

In terms of the approach, this study uses the intermediation approach. In practice, the intermediation approach is the most widely used technique to measure efficiency (Kwan, 2002). Berger and Humphrey (1997) suggest that the intermediation approach is the best for evaluating an entire bank because it is inclusive of interest expense, which often accounts for one-half to two-thirds of the total costs. The intermediation approach follows the traditional banking framework in which the bank transforms funds using labour and physical capital into interest earnings on balance sheet items such as various types of loans (Isik and Hassan, 2003a).

In addition, the Islamic financial system is based on the principle of participation in enterprise or equity-based activities where the business participants may end up with profit or loss; this implies the importance of intermediary activities (Ahmad Mokhtar et al., 2006b). Yudistira (2004) recommends the use of the intermediation approach as it is in line with the principles of the Islamic financial system. Here, the Islamic banks act as financial intermediaries using the funds provided by the shareholders, depositors and investment account holders for financing, trading and investment purposes. The same staff and fixed assets (for example, offices) are also used to produce the outputs which are the financing (such as *murabahah* and *ijarah* financing) and other earnings assets, as shown in Figure 1.

Figure 1: Input-output relationship in Islamic banking (intermediation approach)



This study refers to the work of Hassan (2006) that examined the efficiency of Islamic banks across countries. Accordingly, by using the intermediation approach as in many banking studies (see, for example, Isik and Hassan, 2002, 2003a and 2003b), the Islamic banks are modelled as multi-product firms, producing two outputs and employing three inputs. All the variables are measured in millions of US dollars. The input variables are: (1) labour, (2) fixed capital, and (3) total funds. The labour is measured by staff costs; fixed capital is measured by the costs of the premises and fixed assets; and total funds are measured by the sum of the deposits (demand and time) and non-deposit funds¹ as at the end of the accounting period. On the other hand, the output variables include total loans² and other earning assets³.

After estimating the technical efficiency of the Islamic banks, second-stage panel regression analysis is performed to explain the determinants. The panel data is used to analyse the determinants of efficiency. By referring to Brooke (2008), the panel data equation is as follows:

$$y_{it} = \alpha + \beta x_{it} + u_{it}$$

where y_{it} is the dependent variable, α is the intercept term, β is a $k \times 1$ vector of the parameters to be estimated on the explanatory variables, and x_{it} is a $1 \times k$ vector of the observations of the explanatory variables,

$t = 1, \dots, T; i = 1, \dots, N$.

The common determinants are used for both the bank-specific and country-specific variables. The incorporation of country-specific variables is important due to recent research (see, for example: Dietsch and Lozano-Vivas, 2000; Chaffai et al., 2001) which has found that country-specific variables affect the efficiency score especially in international studies. The variables are as shown in Table 1.

¹ Non-deposits funds include borrowed funds from inter-bank, central bank, domestic banks, overseas banks and others as well as funds raised by issuing securities (Hassan, 2006).

² BankScope defines uniform term loans for both Islamic and conventional banks. For Islamic banks, it means mostly *Murabahah* types of transactions (Hassan, 2006).

³ Other earning assets include loans and advances to banks, trading securities, investments in properties and any related earnings assets.

Table 1: Description of the variables used as determinants of efficiency

Variable	Description	Relationship	Remarks
Bank-specific			
ROA	Return on assets	+ve/-ve	It is a proxy of bank profitability. A bank becomes more efficient as a result of enhancing its profitability. There can be a positive relationship with bank efficiency (see, for example: Isik and Hassan, 2002a; Hassan and Marton, 2003; Miller and Noulas, 1996; Hassan, 2006; Pasiouras, 2008b; Sufian, 2009) or a negative relationship with bank efficiency (see, for example: Casu and Girardone, 2004; Ataullah and Lee, 2006).
lnTA	Natural logarithm of total assets	+ve/-ve	It is used as a proxy of bank size to capture the possible cost advantages associated with size (economies of scale). There can be a positive relationship with bank efficiency (see, for example: Aly et al., 1990; Miller and Naulas, 1996; Hauner, 2005; Hassan, 2006) or a negative relationship with bank efficiency (see, for example: Darrat et al., 2002; Isik and Hassan, 2002a and 2003a).
EQTA	Total equity to total assets	+ve/-ve	It is used as a proxy of capital adequacy where regulators view a higher level of equity as a cushion of future losses. There can be a positive relationship with bank efficiency (see, for example: Berger and Mester, 1997; Isik and Hassan, 2003a; Casu and Girardone, 2004) or a negative relationship (see, for example: Akhigbe and McNulty, 2005; Sufian, 2009).
Country-specific			
lnGDP	Natural logarithm of gross domestic product per capita	+ve/-ve	It is used as a proxy for economic conditions. Per capita income affects numerous factors related to the demand for bank loans and deposits. There can be a positive relationship with efficiency (see, for example: Chaffai et al., 2001; Kablan, 2010) or a negative relationship (see, for example: Pasiouras, 2008a; Sufian, 2009).

Both the bank-specific variables (namely, ROA, lnTA and EQTA) and country-specific variable (namely, lnGDP) are the determinants of efficiency. The variables of total assets and GDP are transformed into the natural logarithm of total assets and the natural logarithm of GDP, respectively. As indicated by Tabachnik and Fidell (1996), the transformation to the natural logarithm basically stabilises the variance of a sample and normalises skewed sample distributions which would weaken the statistical relationship. Hence, it minimises the possibility of violating the regression analysis.

The panel regression ordinary least squared (OLS)⁴ model is used to explain the direction and significance of the effects on technical efficiency (namely, OTE, PTE and SE). The Hausman test is also performed to decide whether the fixed effect model or random effect model is to be used for the regression analysis. In order to analyse this regression model, STATA 10 is used. STATA 10 is data analysis and statistical software that can analyse cross-sectional, time-series and panel data.

Research Findings

Islamic Banks' Efficiency Based on the Common Frontier

The standard or basic approach was taken by defining the common frontier and pooling the dataset of the Islamic banks of all countries and considering a DEA model with three (3) banking inputs and two (2) outputs. This approach does not incorporate the country-specific environmental conditions of respective countries (Hassan et al., 2000). In DEA, the decision-making units are assumed to be involved in similar activities, to produce a common set of outputs, and to operate in comparable environments (Avkiran, 2006). Therefore, the scores are obtained under the assumption that the efficiency differences across countries can be attributed entirely due to managerial decisions within banks regarding the scale and mix of inputs (Pasiouras, 2008a)⁵. The OTE, PTE and SE of Islamic banks for the 4-year average are shown in Table 2.

⁴ There are many studies that use OLS regression in the second stage of DEA (see, for example, Ataullah and Le, 2006) and some studies that favour OLS as compared to Tobit regression (see, for example, McDonald, 2009).

⁵ The environmental variables and bank-specific variables are incorporated in the second-stage regression analysis when examining the determinants of the Islamic banks' efficiency.

Table 2: OTE, PTE and SE of the Islamic banks for the 4-year average (2006-2009) – Common frontier

	OTE	PTE	SE
All Banks	0.487	0.728	0.688

Note:

OTE = Overall technical efficiency

PTE = Pure technical efficiency

SE = Scale efficiency

By looking at the Islamic banking industry as a whole, it can be found that the OTE, PTE and SE for the 4-year average were 48.7%, 72.8% and 68.8%, respectively. Hence, the average bank in the sample could improve its OTE, PTE and SE by 51.3%, 27.2% and 31.2%, respectively. In general, the inefficiency was due to scale inefficiency and not pure technical inefficiency. This means that the source of inefficiency of the Islamic banks was their operation at the wrong scale. The Islamic banks were either operating at increasing return to scale (IRS) or decreasing return to scale (DRS). IRS indicates that an increase in inputs results in a higher increase in outputs, while DRS means that an increase in inputs results in lesser output increases. Hence, Islamic banks that have experienced IRS in their operations could achieve significant cost savings and efficiency gains by increasing their scale of operations. Substantial gains can be obtained by altering the scale via internal growth or further consolidation in the sector (Sufian and Noor, 2009). In contrast, the Islamic banks that were operating at DRS should consider downsizing because those banks have already grown beyond their most productive scale size. However, it is more time-consuming to rectify scale inefficiency as compared to pure technical inefficiency (Avkiran, 2006).

As the source of inefficiency for the Islamic banks was largely the scale inefficiency, Table 3 shows the percentage share of the Islamic banks' return to scale based on a common frontier where the Islamic banks are compared globally.

Table 3: All Islamic banks' RTS for 2006, 2007, 2008 and 2009
(percentage share) – Common frontier

Year		IRS	CRS	DRS	Total
2006	No. of banks	12	8	37	57
	% share	21	14	65	100
2007	No. of banks	13	7	38	58
	% share	22	12	66	100
2008	No. of banks	12	12	34	58
	% share	21	21	58	100
2009	No. of banks	12	10	29	51
	% share	23	20	57	100

Note:

RTS = Return to scale

IRS = Increasing return to scale

CRS = Constant return to scale

DRS = Decreasing return to scale

The majority of the Islamic banks were operating at DRS (65% in 2006; 66% in 2007; 58% in 2008; and 57% in 2009). Operating at DRS means that when the bank increases its inputs, the result will be a less than proportionate increase in their outputs. Some of the banks were operating at IRS (21% in 2006; 22% in 2007; 21% in 2008; and 23% in 2009) where a rise in inputs resulted in a more than proportionate rise in outputs. Only a small percentage of the Islamic banks were operating at the optimum scale, that is, constant return to scale (CRS) (14% in 2006; 12% in 2007; 21% in 2008; and 20% in 2009). These were the only banks operating at the right scale.

The result is not surprising since many studies have found that the source of technical inefficiency is mainly scale inefficiency (see, for example: Miller and Noulas, 1996; Isik and Hassan, 2002a; Maghyreh, 2004; Hassan, 2006; Sufian, 2006 and 2007; Mohd. Tahir et al., 2009), although there are also studies finding that the sources of technical inefficiency are linked to pure technical inefficiency (see, for example: Aly et al., 1990; Yudistira, 2004; Pasiouras, 2008a) where the pure technical inefficiency is due to the misallocation of inputs in producing outputs by the banks regardless of scale effect.

Islamic Banks' Efficiency Based on Specific Frontier

In order to minimise the effects of environmental or regional factors that influence the efficiency scores using the common frontier, this study categorised the Islamic banks into specific frontiers, that is, banks from MENA countries or banks from Asian countries (based on their own regional frontier). The OTE, PTE and SE of the Islamic banks in the MENA countries for the 4-year average are shown in Table 4.

Table 4: OTE, PTE and SE of Islamic banks, 4-year average (2006-2009) – MENA countries

	OTE	PTE	SE
MENA countries	0.490	0.795	0.637

Note:

OTE = Overall technical efficiency

PTE = Pure technical efficiency

SE = Scale efficiency

Interestingly, it is found that the results do not differ much from the earlier findings using the common frontier. This may be due to the fact that large numbers of the Islamic banks in the sample were from MENA countries (more than 65%). Similarly, the main source of inefficiency for the Islamic banks in MENA countries was scale inefficiency.

Based on the results, the technical inefficiency exhibited by the banks stemmed from their operation at the wrong scale (operating either at IRS or DRS), but did not result from pure technical inefficiency. Table 5 shows the return to scale for the Islamic banks in the MENA countries based on the specific frontier; that is, comparing the banks within their region.

Table 5: Islamic banks' RTS for 2006, 2007, 2008 and 2009 (percentage share) in MENA countries –Specific frontier

Year		IRS	CRS	DRS	Total
2006	No. of banks	13	5	23	41
	% share	32	12	56	100
2007	No. of banks	9	7	26	42
	% share	21	17	62	100
2008	No. of banks	10	8	22	40
	% share	25	20	55	100
2009	No. of banks	7	5	22	34
	% share	20	15	65	100

Note:

RTS	=	Return to scale
IRS	=	Increasing return to scale
CRS	=	Constant return to scale
DRS	=	Decreasing return to scale

Further investigation was carried out by calculating the percentage of the Islamic banks based on their RTS in the MENA countries. It shows that the majority of the Islamic banks were operating at DRS (56% in 2006; 62% in 2007; 55% in 2008; and 65% in 2009). Some Islamic banks were operating at IRS (32% in 2006; 21% in 2007; 25% in 2008; and 20% in 2009). However, there were only some Islamic banks (12% in 2006; 17% in 2007; 20% in 2008; and 15% in 2009) operating at the CRS, that is, the optimum scale. These were the banks operating at the most productive scale size.

The OTE, PTE and SE of the Islamic banks in the Asian countries for the 4-year average are shown in Table 6. It was found that the efficiency scores of the Islamic banks in these countries were much higher compared to those of the MENA countries. This may be due to the smaller gap and variation among the Islamic banks in the Asian countries.

Table 6: OTE, PTE and SE of Islamic banks (4-year average) – Asian countries

	OTE	PTE	SE
Asian countries	0.857	0.929	0.922

Note:

OTE	=	Overall technical efficiency
PTE	=	Pure technical efficiency
SE	=	Scale efficiency

High average efficiency scores for OTE, PTE and SE were calculated for these Islamic banks (85.7%; 92.9% and 92.2%, respectively). Similarly, the main source of inefficiency for Islamic banks in Asian countries was due to scale inefficiency although the difference between PTE and SE on average was only minimal (0.7%). Hence, the overall findings show that the source of inefficiency of the Islamic banks in Asian countries was also scale inefficiency although the difference between PTE and SE was minimal. Hence, the banks that were already operating at the optimum scale should focus on their selection of inputs to improve pure technical efficiency. Table 7 shows the RTS for Islamic banks in Asian countries based on their own specific frontier.

Table 7: Islamic banks' RTS for 2006, 2007, 2008 and 2009
(percentage share) Asian countries – Specific frontier

Year		IRS	CRS	DRS	Total
2006	No. of banks	3	6	7	16
	% share	19	37	44	100
2007	No. of banks	3	7	6	16
	% share	19	44	37	100
2008	No. of banks	3	8	7	18
	% share	17	44	39	100
2009	No. of banks	3	9	5	17
	% share	18	53	29	100

Note:

RTS = Return to scale

IRS = Increasing return to scale

CRS = Constant return to scale

DRS = Decreasing return to scale

Calculating the percentage of Islamic banks based on their RTS for Asian countries shows some operating at IRS (19% in 2006; 19% in 2007; 17% in 2008; and 18% in 2009) and some operating at DRS (44% in 2006; 37% in 2007; 39% in 2008; 29% in 2009). A higher percentage of banks was operating at the optimum level which is at CRS (37% in 2006; 44% in 2007; 44% in 2008; and 53% in 2009). This shows that the banks that were already operating at CRS needed to further improve their input utilisation to enhance their OTE. Finally, it can be noted that

the trend shows that the Islamic banks in the Asian countries had high and constant scores of OTE, PTE and SE for the four year period, and that a high percentage of Islamic banks were operating at their most productive scale. Hence, the Islamic banks in the Asian countries when compared in their specific frontier produced higher average efficiency scores.

Ranking of Islamic Banks' Efficiency

This study also examines the efficiency score using the common frontier on average for the four year period (2006 to 2009) for each individual bank, and ranks it accordingly from the highest score to the lowest score. Hence, the management of each Islamic bank can be compared, from the most efficient to the least efficient. This comparison can benefit policy makers and facilitate further analysis of each Islamic bank in future research. The individual characteristics of the Islamic banks can also be examined further.

Table 8 shows the ranking of Islamic banks for PTE on average for the period 2006-2009. PTE is a measure of efficiency without scale effects. It only relates to the ability of managers to utilise the bank's given resources irrespective of their scale. It is found that thirteen (13) Islamic banks were purely technically efficient on average. These banks were: ABC Islamic Bank; Abu Dhabi Islamic Bank; Al Rajhi Bank; Albaraka Islamic Bank; Amlak Finance PJSC, Arcapita; Dubai Islamic Bank; EONCAP Islam Bank; First Investment Company; First National Bank Modaraba; Investors Bank; Qatar International Islamic Bank; and Standard Chartered Modaraba. It should be noted that the average scores for First Investment Company and Standard Chartered Modaraba were based on the two year average, and the score for First National Modaraba was only based on 2009 due to data unavailability. Under the assumptions of variable return to scale, by avoiding the scale, it is found that the majority of the efficient Islamic banks were again from the GCC. In contrast, among the least efficient banks (with scores less than 0.4) were Arab Finance House, Bank Syariah Mandiri, Meezan Bank, Jordan Islamic Bank and A'Ayan Leasing and Investment Company.

Table 8: Ranking of Islamic banks for PTE (average 2006-2009) – All banks

Country	Bank	2006	2007	2008	2009	Average	Ranking
Bahrain	ABC Islamic Bank	1	1	n/a	1	1.000	1
UAE	Abu Dhabi Islamic Bank	1	1	1	1	1.000	1
Saudi Arabia	Al Rajhi bank	1	1	1	1	1.000	1
Bahrain	Albaraka Islamic Bank	1	1	1	1	1.000	1
UAE	Amlak Finance PJSC	1	1	1	n/a	1.000	1
Bahrain	Arcapita Bank	n/a	1	1	1	1.000	1
UAE	Dubai Islamic Bank	1	1	1	1	1.000	1
Malaysia	EONCAP Islamic Bank	1	1	1	1	1.000	1
Kuwait	First Investment Company	n/a	n/a	1	1	1.000	1
Pakistan	First National Bank Modaraba	n/a	n/a	n/a	1	1.000	1
Bahrain	Investors Bank	1	1	1	n/a	1.000	1
Qatar	Qatar International Islamic Bank	1	1	1	1	1.000	1
Pakistan	Standard Chartered Modaraba	1	n/a	1	n/a	1.000	1
Malaysia	Hong Leong Islamic Bank	1	0.952	1	1	0.988	14
Iran	Bank Tejarat	1	1	1	0.887	0.972	15

Table 8: Ranking of Islamic banks for PTE (average 2006-2009) – All banks(Cont)

Country	Bank	2006	2007	2008	2009	Average	Ranking
Bahrain	Venture Capital Bank	0.912	1	1	n/a	0.971	16
Kuwait	Kuwait Finance House	0.785	1	1	1	0.946	17
Qatar	Qatar Islamic Bank	0.753	1	1	1	0.938	18
Iran	Bank Maskan	0.792	0.992	0.952	1	0.934	19
Kuwait	Investment Dar Company	0.83	1	n/a	n/a	0.915	20
Iran	Bank Saderat Iran	1	0.881	0.883	0.873	0.909	21
Turkey	Turkiye Finans Katilim Bankasi	0.89	0.974	0.778	n/a	0.881	22
Iran	Bank Mellat	0.663	1	1	0.802	0.866	23
UAE	Tamweel PJSC	0.78	0.614	1	1	0.849	24
Malaysia	Affin Islamic Bank	1	1	1	0.323	0.831	25
Iran	Bank Sepah	0.66	0.862	0.909	0.862	0.823	26
Bahrain	Shamil Bank of Bahrain	0.602	0.562	1	1	0.791	27
Brunei	Bank Islam Brunei	0.89	0.868	1	0.357	0.779	28
Malaysia	RHB Islamic Bank	1	0.652	0.805	0.641	0.775	29
Bahrain	Al Salam Bank	0.881	0.704	0.599	0.883	0.767	30
Turkey	Bank Asya-Asya Katilim Bankasi	0.769	0.835	0.749	0.669	0.756	31

Table 8: Ranking of Islamic banks for PTE (average 2006-2009) – All banks(Cont)

Country	Bank	2006	2007	2008	2009	Average	Ranking
Bahrain	Unicorn Investment Bank	n/a	1	0.976	0.201	0.726	32
Saudi Arabia	Bank Al-Bilad	1	0.942	0.516	0.386	0.711	33
Malaysia	Bank Islam Malaysia	0.79	0.713	0.418	0.912	0.708	34
Bahrain	Capinvest	0.464	0.784	n/a	0.865	0.704	35
Malaysia	CIMB Islamic	0.453	0.357	1	1	0.703	36
Yemen	Saba Islamic Bank	0.412	0.528	0.864	0.957	0.690	37
Sudan	United Capital Bank	0.71	0.638	0.66	n/a	0.669	38
Sudan	Tadamon Islamic Bank	0.502	0.492	0.743	0.857	0.649	39
Malaysia	Bank Muamalat Malaysia	1	0.553	0.509	0.518	0.645	40
Bahrain	Gulf Finance House	0.638	n/a	n/a	n/a	0.638	41
Bangladesh	Shahjalal Islamic Bank	0.585	0.789	0.802	0.29	0.617	42
Pakistan	First Habib Modaraba	0.179	n/a	0.654	1	0.611	43
Egypt	Faisal Islamic Bank of Egypt	0.775	0.707	0.505	0.435	0.606	44
UAE	Sharjah Islamic Bank	0.883	0.54	0.532	0.368	0.581	45
Pakistan	Emirates Global Islamic Bank	1	0.673	0.326	0.231	0.558	46
Turkey	Kuwait Turkish Participation Bank	0.579	0.604	0.545	0.414	0.536	47

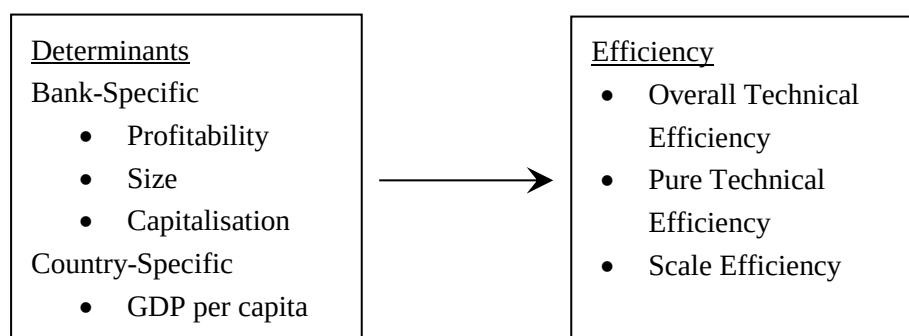
Table 8: Ranking of Islamic banks for PTE (average 2006-2009) – All banks(Cont)

Country	Bank	2006	2007	2008	2009	Average	Ranking
Palestine	Arab Islamic Bank	0.388	0.463	0.574	0.684	0.527	48
Bangladesh	ICB Islamic Bank	0.447	0.666	0.618	0.25	0.495	49
Egypt	Egyptian Saudi Finance Bank	0.392	0.393	0.603	0.578	0.492	50
Pakistan	Dawood Islamic Bank	n/a	0.688	0.346	0.433	0.489	51
Tunisia	BEST Bank	0.325	0.427	0.656	0.467	0.469	52
Sudan	Industrial Development Bank	0.235	0.259	0.381	1	0.469	52
Iraq	Kurdistan International Bank	0.342	1	0.15	0.376	0.467	54
Qatar	First Finance Company	0.4	0.293	0.681	n/a	0.458	55
Bahrain	Khaleeji Commercial Bank	0.374	0.547	0.5	0.388	0.452	56
Malaysia	Asian Finance Bank	n/a	0.681	0.199	0.455	0.445	57
Pakistan	BankIslami Pakistan Limited	0.664	0.574	0.275	0.234	0.437	58
Lebanon	Arab Finance House	0.404	0.427	0.362	n/a	0.398	59
Indonesia	Bank Syariah Mandiri	0.315	0.173	0.503	n/a	0.330	60
Pakistan	Meezan Bank	0.311	0.246	0.416	0.33	0.326	61
Jordan	Jordan Islamic Bank	0.322	0.222	0.445	0.303	0.323	62
Kuwait	A'Ayan Leasing and Investment Company	0.209	0.21	0.35	n/a	0.256	63

Determinants of Islamic Banks' Efficiency

In order to find the determinants of Islamic banks' efficiency as depicted in Figure 2, three panel regression OLS models are tested. The common determinants include bank-specific factors (namely, size, profitability and capitalisation) and a country-specific variable (namely, economic conditions). The natural logarithm of total assets is the proxy for size; return on assets is the proxy for profitability; total equity per total assets is the proxy for capitalisation; and the natural logarithm of GDP per capita is the proxy for economic conditions.

Figure 2: Determinants of Islamic banks' efficiency



There are three models to examine the determinants of overall technical efficiency, pure technical efficiency and scale efficiency, respectively. Table 9 summarises the results of Models 1, 2 and 3. In Model 1, it is found that the country-specific factor, namely, the country's economic condition measured by GDP per capita, had a significant positive effect on OTE at the 1% level. However, it is found that size had a significant negative effect on OTE at the 10% level. Profitability as measured by ROA had a negative effect at the 10.5% level. Since OTE can be decomposed into PTE and SE, Model 2 and Model 3 examine the determinants of PTE and SE, respectively. In Model 2, it is found that size and capitalisation had a significant positive effect on PTE at the 1% level. However, GDP per capita had a significant positive effect at the 15% level and profitability had a negative effect on PTE although it was not significant. In Model 3, it is found that GDP per capita had a significant positive effect on SE at the 1% level. However, size had a negative significant effect on SE at the 1% level. It is also found that profitability and capitalisation had a negative effect on SE although the effect was not significant.

The positive effect of GDP per capita is an important indicator as studies (see, for example: Chaffai et al., 2001; Kablan, 2010) that include various country-specific factors have found a significant positive effect on efficiency. This is due to the fact that the income per capita of a country can affect many factors related to the activities of financial intermediaries, such as the demand for financing, investment and deposits. This shows that the fundamental factors of good economic conditions for both MENA, including GGC, and Asian countries can influence the level of efficiency of the Islamic banks.

It is found that bank size had a negative effect on overall technical efficiency and scale efficiency. This finding supports earlier studies (see, for example: Darrat et al., 2002; Isik and Hassan, 2002a and 2003a) that found a negative relationship. In the case of this study, the negative relationship might be due to the findings that the majority of the Islamic banks especially in the MENA were operating at DRS. Hence, these banks were too large and may have been operating at the less optimum scale; that is, they were scale inefficient. However, the bank size had a significant positive effect on PTE at the 1% level; and this finding is supported by many previous studies (see, for example: Aly et al., 1990; Miller and Naulas, 1996; Hauner, 2005; Hassan, 2006). In these cases, the management of the bigger banks were more efficient in converting their inputs into outputs regardless of their scale.

Table 9: Summary of Model 1, Model 2 and Model 3 results

	Model 1		Model 2		Model 3	
	OTE		PTE		SE	
	Coef.	P > (t)	Coef.	P > (t)	Coef.	P > (t)
ROA	-0.0056	0.105	-0.0023	0.492	-0.0045	0.203
lnTA	-0.0423	0.062	0.0552	0.007	-0.1019	0.000
EQTA	0.0016	0.263	0.0038	0.004	-0.0019	0.143
lnGDP	0.0756	0.002	0.0317	0.147	0.0569	0.008
Constant	0.0915	0.625	-0.0404	0.808	0.9732	0.000
R-squared	15.03%		19.87%		29.29%	

Note:

- OTE = Overall technical efficiency
- PTE = Pure technical efficiency
- SE = Scale efficiency
- ROA = Return on assets
- lnTA = Return to natural logarithm of total assets
- EQTA = Total equity per total assets
- lnGDP = Return to natural logarithm of GDP per capita

It is also found that the capitalisation of Islamic banks had a positive effect on pure technical efficiency at the 1% level. This positive relationship with bank efficiency is expected as studies (see, for example: Berger and Mester, 1997; Isik and Hassan, 2003a; Casu and Girardone, 2004) viewed the higher level of equity as a cushion for future losses.

Finally, it is found that profitability had a negative effect on overall technical efficiency, pure technical efficiency and scale efficiency, however it was not significant. This is surprising as many studies have found that financial performance, especially ROA, is significantly positively related to technical efficiency (see, for example: Isik and Hassan, 2002a; Hassan and Marton, 2003; Miller and Noulas, 1996; Hassan, 2006; Pasiouras, 2008b; Sufian, 2009) compared to studies that found a negative relationship (see, for example: Casu and Girardone, 2004; Ataullah and Le, 2006) and a few studies (see, for example: Sherman and Zhu, 2006; Laurenceson and Qin, 2008) that found an insignificant relationship between profitability and efficiency. Hence, as argued by Duncan and Elliott (2004), the inconsistency of the positive relationship between efficiency and financial performance suggests that financial institutions that pursue improved financial performance through the single-minded focus on lower costs may be fundamentally misguided. In this case, the Islamic banks might have been operating in unfavourable country environments. As explained by Avkiran (2006), the “unlucky” unit may well be operating at maximum efficiency when compared to its peers. However, it is not captured in accounting profitability measures.

Conclusion

This study finds that the Islamic banks globally on average were purely technical efficient in the study period. However, the main source of technical inefficiency was due to the Islamic banks operating at the wrong scale, particularly the majority of Islamic banks operating at DRS where they needed to reduce their inputs to achieve optimum scales. Hence, the Islamic banks in general obtained high scores for pure technical efficiency, and this indicates that the banks’ management were

able to efficiently control the costs and use the mix of inputs to produce outputs regardless of scale effects.

The differences in scores for the Islamic banks in the MENA countries and Asian countries might be due to the country-specific factor that influences the efficiency score. Furthermore, the comparison of Islamic banks across Asian countries might not have produced huge gaps as there were only 18 banks from 5 different countries, most of them were from Malaysia and Pakistan, and the efficiency scores were relatively high. This was different for an Islamic bank from a MENA country as there were 42 banks represented by 15 different countries, and that may have caused the average score to be quite low for their region. However, by examining individual Islamic banks, it is found that the most efficient Islamic banks were from GCC. The Islamic banks from Asian countries that were efficient among their group were still ranked lower when they were compared globally.

The economic condition of a country was the main determinant of an Islamic bank's efficiency. This explains the importance of environmental factors that can influence the efficiency of Islamic banks. Good and stable economic conditions are an advantage for Islamic banks in acting as efficient financial intermediaries. In relation to bank-specific factors, capitalisation showed a positive influence on efficiency. This shows that well-capitalised Islamic banks were efficient. However, the size of Islamic banks had a significant negative effect on scale efficiency. The possible reason for this is that the majority of the Islamic banks were too large and operating at DRS. However, this was not the case for pure technical efficiency, where larger banks tended to be more technically efficient. Islamic banks that operate at too large a scale of operation may find it difficult to use their resources efficiently and hence produce at less than the optimum scale. Moreover, the negative effect of profitability on efficiency might raise a question about the efficiency measures that are not captured by accounting profitability measures. This might be due to some efficient Islamic banks operating in an unfavourable country environment that affects their profitability.

Finally, this study can make a significant contribution especially to the understanding of the performance of Islamic banks in MENA and Asian countries in the period before and after the financial crisis (from 2006 to 2009). The findings have measured and explained the efficiency of

Islamic banks, and an improvement in such efficiency can lead to higher profits and survival in a competitive environment and sustain financial crisis. This gives some insight to policy makers, especially in the central banks and international bodies such as the Islamic Financial Services Board, as the sector's long-term sustainability depends on economic efficiency including technical efficiency (Hassan, 2006). Moreover, identifying the sources of inefficiencies can improve organisational learning which is a source of competitive advantage (Avkiran, 2009). Hence, Islamic banks need to move forward by utilising their resources to become more efficient and to ensure healthy growth in their industry.

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A Study of the Competitiveness of Iran's Banking System

Reza Najarzadeh¹, Michael Reed², Hadi Mirzanejad³

In this article the Panzar and Rosse approach is employed to assess the level of competition in the Iranian banking system during 1997-2010. Panel data is used for all the 18 banks (private and public) that have been commercially active for at least the last four years. The results show that during the period of the study the banking system has been operating under a monopolistic competition system. It is also shown that allowing competition among private banks has improved the competitive environment. Finally, the results indicate that with private banks entering the market, competition in the entire banking system has risen.

A Study of the Competitiveness of the Iran's Banking System

The formation of capital is vital for most economic activities. The role of banks differs somewhat by country, but they always are the key players channeling money for business investments. A sound and efficient banking system is a prerequisite and a major factor for economic growth. Liquidity management, reducing transaction and information costs, and shifting and lowering risk are some of the main benefits of banks in their pivotal role as financial intermediaries. An efficient and well performing banking system prevents people from going to non-professional and often risky financial agencies and middlemen with no regulations. Competition in the banking system is also important because it improves resource allocation and enhances growth. Understanding the level of competition among banks can indicate if the banking system is working efficiently.

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Yet bank competition has been a controversial issue historically. The Iranian government nationalized all banks in 1983 after the revolution; only public (or government owned and managed) banks were allowed to exist. Politicians, religious leaders and others had many excuses for not allowing the private sector to enter this market. This brought about many challenges for the banking sector and many shortcomings and inefficiencies developed. Economists and other observers have argued for many years that competition would increase interest rates paid on deposits, improve bank services, and force banks to be more responsive to consumer demands. The government decided to sell its ownership in some banks to the private sector in 1999 and to allow for private banks to be established. This paper studies the competitive effects of private sector entry into the banking sector in Iran. It is important to see whether allowing private banking has improved the competitive environment for Iran.

There are different ways to assess the level of competition in an industry but the method presented by Panzar and Rosse (1987) has advantages over other methods because it allows for the different roles that various firms play; whether they are large or small firms, domestic or foreign firms, or have other categorizations. This Panzar and Rosse method uses firm-level data and allows for firm-specific differences in the production function. Its special advantage is that it can be used in instances where data availability is limited (Claessens and Laeven, 2004 and Mensi, 2009). For these reasons we have used the Panzar and Rosse approach to study the level of competition in Iran's banking system during 1997-2010.

Literature Review

The literature on the measurement of competition can be divided into two major streams: structural and non-structural approaches. Structural methods are based on the Structure-Conduct-Performance paradigm (SCP) and the Efficiency Hypothesis which has its roots in the Empirical Industrial Organization (EIO) theory. The proponents of the SCP paradigm believe that a highly concentrated market leads to market power and collusion among large companies in the market. This in turn leads to a monopoly or oligopolistic outcome for the whole market. The proponents of the Efficiency Hypothesis believe that it is the efficiency and high productivity of larger firms that enhances their performance

and leads to monopolistic behavior of these firms. Firms are large because they have lower costs and they drive out higher cost firms. These structural approaches measure competitive conduct indirectly and rely on relationships between structure, conduct and performance of market for inferences about competition.

In both of these structural approaches the degree of market competition is ascertained indirectly through the study of the firm behavior. Concentration ratios play a key role in determining the competition level of the banking system. The significance of a structural approach is that it can explain the relationships among different sectors of a market. The application of the SCP to the banking market has been criticized by various authors such as Gilbert (1984), Reid (1987), Vesala (1995) and Bos (2002).

The New Empirical Industrial Organization (NEIO) literature argues that the level of competition cannot be measured solely by a market's structural indices. Simply because a market has a high concentration ratio does not mean that firms are able to charge higher prices. Mathews et al. (2007) showed that the use of profitability to assess competition in the banking industry leads to misleading conclusions. As a result, the literature, such as Lerner (1934), Iwata (1974), Bresnahan and Lau (1982) and Panzar and Rosse (1987), has moved to non-structural methods based on economic theories to assess the level of competition.

The Panzar and Rosse model is theoretically derived from the long run profit maximization conditions for firms. In order to reach the equilibrium output for the firm, the profit level should be maximized both at individual firm level and for the industry as a whole. This implies, first, that the i^{th} firm equates its marginal revenue to its marginal cost:

$$R'_i(x_i, n, z_i) - C'_i(x_i, w_i, t_i) = 0$$

Where R_i is revenue, C_i is cost, X_i is the i^{th} firm's output, n is the number of firms, w_i is a vector of m input prices, Z_i is a vector of exogenous variables that make up a firm's revenue and t_i is a vector of exogenous variables that make up a firm's costs. In equilibrium we have the following condition implying zero profit:

$$R_i^*(x_i, n, z_i) - C_i^*(x_i, w_i, t_i) = 0$$

Variables with an asterisk are equilibrium values. Market power is measured by a change in equilibrium revenue (∂R_i^*) brought about by a change in input prices (w_i). Panzar and Rosse introduce an H statistic as an index to measure the level (degree) of competition among firms. H is computed from the reduced-form revenue equation. The 'H statistic' is the sum of the elasticities of the reduced form revenues with respect to factor prices:

$$H = \sum_{k=1}^m \frac{\partial R_i^*}{\partial w_{k_i}} \cdot \frac{w_{k_i}}{R_i^*}$$

Where R_i^* is the i^{th} firm's revenue in equilibrium, w is input prices (factor input prices), and m is the number of firm inputs.

Depending on the market structure H can take any value between $-\infty$ and one. The industry is characterized by monopoly or perfect cartel for $H \leq 0$. In this case an increase in input prices will increase marginal costs, reduce equilibrium output and consequently reduce total revenues. Imperfectly competitive firms reduce output in order to stay on the inelastic portion of the demand function.

In perfect competition any increase in input prices leads to increases in marginal and average costs for all firms, which shifts the market supply curve to the left. This increases output prices but forces some firms to leave the market. The remaining firms face higher input prices, but the firm's revenue increases to offset cost hikes. Thus, H equals one ($H=1$) for a perfectly competitive market.

In a monopolistically competitive market, where firms try to use advertising and improve their services by providing a differentiated good, Panzar and Rosse show that the H statistic is between one and zero ($0 < H < 1$). In such markets H is an increasing function of demand elasticity and H rises as market competition increases. Panzar and Rosse show that if their method is to yield plausible results, firms need to have operated in a long-term equilibrium (i.e., the number of firms needs to be endogenous to the model) while the performance of firms needs to be influenced by the actions of other market participants.

Bikker and Haaf (2000) show that four conditions should be met for the Panzar and Rosse results to hold: (1) banks operate in long-term equilibrium, (2) the performance of banks is influenced by actions of other market players, (3) costs in banking are homogeneous (similar) across banks, and (4) demand price elasticity is larger than 1.

Many empirical studies have used the Panzar and Rosse model to investigate the banking industry for various countries. It works well with the banking industry because banks provide multiple outputs with inputs that are not associated explicitly with individual outputs. Bandit and Davis (2000) used concentration indices and the Panzar-Rosse model with data for the period 1992-1996 to show that small banks in France and Germany have a monopoly structure whereas the large banks in these countries and small banks in Italy have a monopolistically competitive market structure. Hempell and Hannah (2002) showed that bank type (such as business, cooperative, and credit banks) has an impact on the degree of competition in the German banking system. They also used concentration indices and the Panzar-Rosse model with data from 1993-1998 in their analysis. Claessens et al. (2003) investigated the degree of banking system competition for 50 countries using the Panzar-Rosse model during 1994-2001. They found the banking system becomes more competitive with the removal of some banking restrictions and the entry of foreign banks into these countries.

Al-Muharrami et al. (2006), in a study of six Persian Gulf countries during 1993 -2002, have shown that the H statistic for Kuwait, Saudi Arabia and the United Arab Emirates indicates perfect competition in the banking system of these three countries. They find that Bahrain and Qatar have a monopolistic competition banking system and Oman has a monopolistic system.

Bikker et al. (2007) studied the banking market of 101 selected countries during 1986-2005 using the Panzar and Rosse model. They showed that dependent variable misspecification causes systematic skewness in the results, pushing the H statistic towards one. They demonstrated that the level of competition in the existing Panzar-Rosse literature is systematically overestimated and that the tests on both monopoly and perfect competition are distorted. This overestimate is due to the use of bank revenues divided by total assets as a dependent variable in the P-R model instead of unscaled bank revenues.

Abbasoglu et al. (2007) used the Panzar- Rosse H statistic to estimate the degree of competition among 27 Turkish banks during 2001-2005. They found that competition among these banks increased until 2004, then fell in 2005. The H statistic was always between zero and one, indicating a monopolistically competitive market structure in Turkey for the period under study.

Jeon et al. (2010) used the Panzar-Rosse model and concentration indices to study the impact of foreign banks on competition of the Asian and South American banking systems during 1998-2008. Their results show that when foreign banks enter these countries the level of competition among domestic banks in the host country goes up. This impact is stronger when a new foreign bank is established in the host country rather than a foreign bank simply purchasing the assets of a domestic bank.

Empirical Model and Data

Bikker and Haaf (2002) developed the following reduced-form revenue equation for a typical bank:

$$\ln II = \alpha + (\beta \ln AFR + \gamma \ln PPE + \delta \ln PCE) + \xi \ln BSF + \eta \ln OI + e \quad (1)$$

Where II represents interest income relative to the bank's total assets (or total funds), AFR is the ratio of annual interest expenses to total funds (the annual funding rate), PPE is the price of personnel expenses relative to total funds, PCE is the price of physical capital expenditure relative to total funds, BSF is bank specific exogenous factors, and OI is the ratio of other income to total assets. AFR, PPE and PCE are considered the inputs for the bank. A subscript to identify each bank is omitted for ease of exposition.

A later study, Bikker et al. (2007), augmented equation (1) to account for more special bank circumstances (especially revenue sources):

$$\ln II = \alpha + \beta \ln AFR + \gamma \ln PPE + \delta \ln PCE + \eta_1 \ln \frac{LNS}{TA} + \eta_2 \ln \frac{ONEA}{TA} + \eta_3 \ln \frac{DPS}{F} + \eta_4 \ln \frac{EQ}{TA} + \eta_5 \ln \frac{OI}{II} + error \quad (2)$$

Equation (2) has the following added variables: LNS/TA which is a ratio of customer loans to total assets, which measures loan risks; $ONEA/TA$ is the percentage of assets that generate no income; DPS/F is the ratio of customers' deposits to total customers' deposits and short term credit security funds (which indicates where the bank obtains its deposits); and EQ/TA which is stockholder equity as a percentage of total assets (or the bank's capitalization); and since today's banks are more than simply financial middlemen, OI/II is the ratio of other income to interest income of banks.

The data set includes all Iranian banks which have been established for at least four years. There are ten government banks and eight private banks in the data set. Total assets in the banking system were 3,330 trillion rials (\$320 billion US)¹. The average government bank had assets of 271 trillion rials (\$26 billion US) in 2010, while the average private bank had assets of 78 trillion rials (\$8 billion US). The total loans in the Iranian banking system were 2,241 trillion rials (\$215 billion US). The average government bank had outstanding loans of 181 trillion rials (\$17 billion US), while the average private bank had outstanding loans of 54 trillion rials (\$5 billion US).

The period studied is during 1997-2010, though the data for some of the private banks are not available for the whole period. If a bank has data for less than four years it is excluded from the study. We use the Bankscope site for most data (www.bankscope.com); the rest are obtained from Iran's Central Bank. Physical capital expenditures are not observable so we use the ratio of other non-interest expenses to fixed assets to measure PCE (Bikker and Groenveld, 2000).

Panel Data Regression Model

A panel data approach using observations of individual banks over time to estimate the model has the advantage of making up for possible weaknesses in either time series or cross-section data (Baltagi, 2001).

¹ The rial is the currency of Iran. The exchange rate used to convert values to dollars is the average rate during July for the year of analysis. The exchange rate came from the International Monetary Fund (http://www.imf.org/external/np/fin/data/param_rms_mth.aspx). All data are from Bankscope (www.bankscope.com) or directly from bank reports.

Before estimating the model we tested that the variables of the model are stationary using a Unit Root Test. Table 2 provides the results from three different tests, Levin et al., Im et al. and the PP – Fisher. All variables are stationary at the 5% level of significance, so no transformation is necessary.

The Limer F-Test

The first question to consider with panel data is whether to use a fixed or random effects model. We answer this question with the Limer F-test:

$$\begin{aligned} H_0 : \alpha_i = \alpha, \beta_i = \beta \text{ (pooled data)} \\ H_1 : \text{Not } H_0 \text{ (panel data)} \end{aligned}$$

The test statistic is:

$$F_{(n-1, nt-n-k)} = \frac{(RSS_R - RSS_{UR}) / (n-1)}{(RSS_{UR}) / (nt-n-k)} \quad (3)$$

RSS_{UR} is the unrestricted residuals sum of squares, RSS_R is the restricted residuals sum of squares, n is the number of sections (banks), t is the time period and k is the number of parameters. Since $F_{(17, 208)} = 10.35$ is larger than the critical F value of 1.62 the H_0 hypothesis is rejected. Therefore, the panel data approach is chosen over the pooled approach. Since all banks are considered (not a subset), the fixed effects method, as opposed to random effects, is more suitable for estimation (Harris and Sollis, 2003). The Hausman test results, which are available upon request, also support this conclusion.

Test of Long Run Equilibrium

Before we turn to presenting the estimation results we need to test the hypotheses of the existence of long run equilibrium in the banking market. One of the basic assumptions of the Panzar and Rosse model is the existence of long run equilibrium in the banking market (Nathan and Neave, 1989). Shaffer (1985) has shown that if a long run equilibrium doesn't prevail in the market then the model is only interpretable when $H \geq 0$. If the sample is not in long-run equilibrium, negative values of the H statistic are not particularly associated with a monopoly market.

An empirical test of the long run competitive equilibrium can be obtained through the regression of equation (2) with the dependent variables of return on assets (ROA) or return on equity (ROE). ROA is the ratio of net profit to total assets and ROE is the ratio of net profit to stock holders' equity. After estimating the models, the H_{ROA} and H_{ROE} statistics is obtained by summing the bank's input price coefficients. These equilibrium tests use the fact that in competitive capital markets, risk-adjusted rates of return will be equalized across banks and rates of return should not be correlated with input prices (Rozas, 2007). Therefore, H should not be significantly different from zero if banks are in long-run equilibrium.

The estimated coefficient is 0.15 for H_{ROA} and 0.039 for H_{ROE} with t -values of 2.78 and 4.97, respectively. We conclude that H_{ROA} and H_{ROE} are significantly different from zero. So the null hypothesis is rejected and we can conclude that Iran does not have long run equilibrium in the banking market.

Estimation Results of the Panzar and Rosse Model

The Panzar and Rosse model was estimated under three different situations. The first is using the entire time series (1997-2010) for all 18 banks. The competition level in this time period is judged using the H statistic and specific tests are performed concerning whether the market is perfectly competitive ($H=1$) or a monopoly ($H<0$). The second situation uses the P-R model to estimate the level of competition during the period when private banks were more prevalent (2002-2010) and tests whether competition among private banks is stiffer than among public banks. The final analysis divides the time period into two, one where private banking was prevalent (2004-2010) and one where it was not prevalent (1997-2003).

Table 3 presents the results for all 18 banks over the entire time period. All of the coefficients in the model are significantly different from zero and the adjusted R^2 is high, 0.91. The coefficients for AFR, PPE, and PCE are 0.53, -0.40, and 0.31, respectively, so their sum is 0.44. The estimated H statistic is significantly different from zero at the 95% confidence level using one-sided tests, so the banking market structure is monopolistically competitive. It is not a pure monopoly or perfectly competitive.

The results when the P-R model is fitted over the 2002-2010 time period and a dummy variable (DUM) is used to identify government banks are presented in Table 4. Many of the coefficients in the model are significantly different from zero and the adjusted R^2 is high, 0.92. For private banks the coefficients for AFR, PPE, and PCE are 0.76, -0.65, and 0.66, respectively, so their sum is 0.77. For government banks the coefficients are the sum of the coefficient for the private bank plus the coefficient for the variable multiplied by the dummy. These coefficients for AFR, PPE, and PCE are -0.16, 0.18, and 0.25, respectively, so their sum is 0.27. The sum of the coefficients for private banks is significantly different from the sum for government banks. Thus there is greater competition among private banks than government banks.

The separation of the data into two time periods is accomplished by a dummy variable (DUMT) that identifies when an observation is in the early period (1997-2003). The results when the P-R model is fitted in this manner are presented in Table 5. All of the coefficients in the model except the one for ONEA/TA are significantly different from zero and the adjusted R^2 is high, 0.93. For the later time period, the coefficients for AFR, PPE, and PCE are 1.00, -0.39, and 0.22, respectively, so their sum is 0.83.

For the earlier time period (1997-2003), the coefficients are the sum of the coefficient for the later time period plus the coefficient for the variable multiplied by the dummy. These summed coefficients for AFR, PPE, and PCE are 0.13, 0.05, and 0.22, respectively, so their sum is 0.40. The summed coefficient for the earlier time period is significantly different and smaller than the summed coefficient for the later time period. Thus, the entry of private banks into the sector has increased competition in Iran's banking sector, which is consistent with our hypothesis.

Conclusion

Banks are important economic agents that play a pivotal role in absorbing capital and idle funds and channeling them to active economic units. Since a competitive banking environment can improve productivity in the banking system and enhance economic growth, a study of the banking market that identifies structural difficulties in this market can lead policy makers to sound, or at least more efficient,

monetary and fiscal policies that match a society's economic goals. The banking system in Iran was exclusively government controlled from 1983 to 1999. The liberalization of the banking industry provides interesting insights into the effects of private entry. In this article we applied the Panzar and Rosse model to 18 government and private banks to assess competition in the banking market In Iran.

Structural tests revealed that neither perfect competition nor pure monopoly conditions govern the banking system in Iran. The results for the entire banking system (18 banks) during 1997-2010 showed that the degree of competition among these banks is 0.44 which indicates a monopolistic competition market structure. The results also showed that there is a significant difference in the degree of competition among private banks (0.76) and government banks (0.25). This indicates that competition among private banks is stiffer. We also showed that when private banks entered the banking system the competition index, H , increased from 0.40 during 1997-2003 to 0.82 during 2004-2010.

Based on the finding of this study we recommend that the Iranian government remove all obstacles for private banks entering the market to enhance productivity and stimulate growth. The government should also reduce its market share of banking, which is more than 75 % right now, and provide incentives for more private banking². And last but not least, although this has not been a study of the effect of government interference policies in the banking market, it is clear that the government should continue to liberalize banking regulations and refrain from policies such as setting interest rate ceilings on private banks and forcing compulsory loans to certain interest groups.

² This percentage is based on total bank capital and it comes from Iran's Central Bank Reports. During the period for this study public banks had not entered into the Tehran Stock Exchange, so they were all government owned and managed.

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Table 1. Basic Statistics on Iranian Banks, 2010.

		Government banks	Private banks
Total assets			
	billion rials	2,709	621
	billion US \$	260	60
Average assets			
	billion rials	271	78
	billion US \$	26	8
Total loans outstanding			
	billion rials	1,813	429
	billion US \$	179	41
Average loans outstanding			
	billion rials	181	54
	billion US \$	17	5

Source: www.bankscope.com and various bank reports.

Table 2. Unit Root Tests for all Variables

Variable	Levin et al.	Im et al.	PP-Fisher
Ln II	-13.52 (0.00)	-6.06 (0.00)	113.28 (0.00)
Ln AFR	9.51 (0.00)	-2.84 (0.00)	51.95 (0.00)
Ln ppe	-2.79 (0.00)	-1.48 -0.07	48.6 -0.02
Ln pce	-2.55 (0.00)	-1.44 -0.08	43.18 -0.05
Ln LNS/TA	-2.13 -0.02	-3.15 (0.00)	78.6 (0.00)
Ln ONEA/TA	-6.23 (0.00)	-2.13 -0.02	36.99 -0.17
Ln DPS/F	-40.26 (0.00)	-15.43 (0.00)	87.12 (0.00)
Ln EQ/TA	-3.45 (0.00)	-1.8 -0.03	75.5 0
OI/II	-8.6 (0.00)	-2.57 (0.00)	62.32 (0.00)

The numbers in parentheses give the significance level for the test statistic

Table 3. Estimated Coefficients from the P-R Model for 1997-2010.

Variable	Coefficient	t-Statistic	Prob.
C	6.390268	9.432468	0.0000
Ln(AFR)	0.525335	5.728442	0.0000
Ln(PPE)	-0.395635	-2.704560	0.0076
Ln(PCE)	0.313755	3.583391	0.0005
Ln(EQ/TA)	-0.433291	-4.686098	0.0000
OI/II	-0.266978	-4.901358	0.0000

R^2 0.92; Adjusted R^2 : 0.91; F-statistic 53.5; H = 0.44

Table 4. Results of the P-R Model for 2002-2010 with a Dummy Variable to Identify Government Banks.

Variable	Coefficient	t-Statistic	Prob.
C	7.977999	10.51320	0.0000
Ln(AFR)	0.761695	6.462369	0.0000
Ln(PPE)	-0.654519	-3.586754	0.0005
Ln(PCE)	0.661022	4.118868	0.0001
OI/II	-0.254242	-4.444698	0.0000
Ln(AFR)*DUM	-0.920185	-4.522008	0.0000
Ln(PPE)*DUM	0.827011	2.914288	0.0044
Ln(PCE)*DUM	-0.410668	-2.281161	0.0246

R^2 : 0.94; adjusted R^2 : 0.92 F-statistic: 51.1; H (privates) = 0.77; H (government) = 0.77 – 0.50 = 0.27

Table 5. Results of the P-R Model for 1997-2010 with a Dummy Variable to the 1997-2003 Period.

Variable	Coefficient	t-Statistic	Prob.
C	8.919804	14.76782	0.0000
Ln (AFR)	0.998995	9.279606	0.0000
Ln (PPE)	-0.394022	-3.363349	0.0010
Ln (PCE)	0.216872	3.159091	0.0020
Ln (ONEA/TA)	0.083906	1.436499	0.1533
OI/II	-0.284479	-6.388182	0.0000
Ln (AFR)*DUM	-0.865668	-7.422036	0.0000
Ln (PPE) *DUM	0.442595	3.323143	0.0012

R^2 : 0.94; adjusted R^2 : 0.93 F-statistic: 63.6; H (2004-2010) = 0.82; H (1997-2003) = 0.82 – 0.42 = 0.40

Did Financial Market Integration Really Happen in MENA Region? – An Analysis

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This paper examines the characteristics and behavior of stock market equity indices of several Middle East and North Africa (MENA) countries. It also explores the cointegrating behavior of the MENA stock markets with the United States equity markets. Granger causality tests based on the VECM reveal strong bidirectional causalities between several of the MENA stock markets. The Granger causalities also indicate that stock market returns of Egypt, Jordan, Kuwait, Malta, Oman, Qatar, Saudi Arabia and Tunisia exhibit cointegrating behavior.

The results reveal significant weak exogeneity from the United States stock markets to all the MENA stock markets. The findings suggest that while MENA stock markets tend to co-move with the U.S. stock market. Furthermore, markets within the MENA region are not yet fully integrated with the U.S. However, market imperfections may preclude U.S. investors from entering MENA markets to take advantage of possible diversification benefits. The increased level of integration of markets within the MENA region does not necessarily reduce the potential of risk diversification for international portfolios.

Introduction

Over the last two decades, the Middle East and North Africa stock markets (MENA) have been regarded as one of the most promising investment opportunities in the world. This emerging market area provides significant portfolio diversification opportunities for investors. Financial liberalization has been implemented in a majority of MENA

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countries through structural adjustment programs and large-scale privatization. These programs helped to promote significant expansion of opportunities for worldwide investors. In addition, a large number of MENA nations adopted macroeconomic stabilization policies that are designed to ensure economic stability, low inflation, and reduced budget deficits. These policies help to attract and retain global investors. The confluence of liberalization reforms, oil revenue increases, excess liquidity, and petrodollar spillovers to adjoining countries has significantly increased market capitalizations, turnovers, IPOs and returns (Hammoudeh and Alesia, 2004). The region reflects growing stock market price movement interdependence. For example, the 2006 Dubai stock market collapse affected prices in varying degrees in Saudi Arabia, Oman, and Egypt (Hammoudeh and Alesia, 2004). Evidence of market integration within the MENA region would have practical importance to those who wish to invest in the region. If the markets within the MENA region tend to move together, an investor would be able to achieve his or her desired risk/return relationship by investing in any of the markets within the region.

The financial integration of the world's major stock markets has been extensively studied in the empirical financial economics literature (see for example, Kaminsky and Schmukler, 2002; Bekaert and Harvey, 2000 and Kim and Singal, 2000). Emerging markets have been emphasized in the literature because they present new opportunities for portfolio and money managers to maximize the return of their portfolios. Bekaert and Harvey (1997) find that stock market returns in emerging markets were high and predictable, but lacked strong correlation with U.S. or European markets. As emerging markets mature and integrate with the world markets, they become more sensitive to the volatility of stock markets elsewhere. Emerging market integration with world markets will decrease their ability to enhance and diversify international portfolios (Neaime, 2002).

Previous research focusing on the integration of stock markets in MENA nations with those in the rest of the world is limited. Neaime (2002) using the Engle-Granger (1987) cointegration approach, test for the integration of MENA markets with world stock markets over the period 1990 to 2000. He finds a weak integration among the MENA markets (Morocco, Egypt, Jordan and Turkey) and strong integration between MENA markets and developed markets (U.S., U.K. and France). The

studies of El-Erian and Kumar (1995), Darrat and Hakim (1997), Hakim and Neaime (2000), and Butler and Malaikah find similar results as Neaime (2002).

An area of interest requiring further investigation centers around the questions of whether MENA area stock markets offer: (1) potential diversification benefits and/or, (2) short run and long run market portfolio substitutability. In addition, we analyze the questions of whether influences from U.S. stock markets affect co-movement of stocks within MENA, and, if MENA markets affect diversification and portfolio substitutability as a hedge or safe haven in the long run. Understanding the dynamics and co-movements of MENA markets will assist individuals in making rational investment choices within the region.

In this paper, we explore the existence of cointegration to determine if MENA countries are segmented or linked to the U.S. stock market (the S&P 500 index). If substantial cointegration exists between the U.S. and MENA markets, we can conclude that inefficiencies in asset prices in one market may affect movements in another market (Roll, 1992). This paper contributes to the existing finance and economics literature by examining dynamic linkages of nine MENA nations among each other and the United States stock markets. To the best of our knowledge, this paper is the first to apply the cointegration testing methodology of Awokuse (2005, a) to investigate dynamic linkages between equity price indices in MENA countries and the U.S. S&P 500 index. Our paper enhances the body of the literature that pertains to financial integration and stock market movements in the MENA region.

The remainder of the paper is organized as follows: Section 1 provides an overview and summarizes the main characteristics and properties of stock markets within the MENA region. A brief summary of the relevant literature is presented in Section 2. Section 3 presents an empirical model to test whether MENA stock markets are integrated with each other. Section 4 employs a Vector Error Correction Model, Granger causality and TYDL tests to further explore the long and short-run dynamics of the stock market return series. Section 5 summarizes and concludes the paper.

Literature Review

Integrated markets tend to move together over time. Bekaert and Harvey (1995) utilize a conditional regime-switching CAPM to study market integration over time. The authors find that several of the emerging markets within their sample became more integrated over time. Adler and Qi (2003) find that the Mexican market is partially integrated with the rest of North America. They also note that the degree of integration was time-varying; Mexico was more integrated with the rest of North America after market reforms were implemented as a response to the Mexican economic crisis.

Other studies that examine the degree of integration within emerging markets find similar results. Bekaert and Harvey (1997) and Carrieri et al. (2006) find that Asian and Latin American emerging markets are partially integrated with the world market and that the level of integration is time-varying. Since these studies rely on a time-varying, partially integrated CAPM, their results are dependent on a model that cannot be thoroughly tested (Roll, 1977).

Other studies utilize bivariate or multivariate cointegration techniques to examine integration in developed and emerging markets. Taylor and Tonks (1989) use Engle and Granger's (1987) bivariate cointegration technique to examine the level of integration between the U.K. stock market and several other developed markets around the world. Kasa (1992) employ Johansen's (1988) multivariate cointegration technique and find that markets in the U.S., U.K., Japan, Germany, and Canada share a long-run integrated relationship. Masih and Masih (1997) also use multivariate cointegration and find that several developed Asian markets are cointegrated with markets in Japan, the U.S., Japan, U.K., and Germany. Masih and Masih (1999) apply vector error-correction as well as level VAR models and find results similar to their aforementioned study.

Several other studies examine the dynamic causal linkages between international stock markets. Masih and Masih (2001) find interdependencies between developed OECD and emerging Asian markets. Lim et al (2003) utilize non-parametric cointegration techniques and find that a shared factor cointegrates Asian stock markets in the long-run. Wang and Nguyen Thi (2007) as well as Iwatsubo and Inagaki (2007) find similar results.

Research that focuses on the integration of stock markets within the MENA region with each other and the rest of the world is limited. Darrat et al. (2000) find that stock markets in Egypt, Jordan and Morocco are integrated, but segmented globally; the authors' note that Egyptian stock market appear to be the driving force within the region. However, Omran and Gunduz (2001) find no evidence of cointegration between stock markets in Turkey, Israel, Egypt, Morocco and Jordan. Hammoudeh and Aleisa (2004) study the stock markets of five Gulf Cooperation Council (GCC) nations and find long run integration relationships as well as short-term lead/lag feedback. Bley and Chen (2006) find that the degree of market integration among GCC nations had increased over time.

Bley (2007) examine the dynamic behavior for fourteen MENA stock markets and find that these markets have become more integrated over time. Neaime (2002) examine the impact of financial liberalization within the MENA region. He reports that Turkey, Egypt, Morocco, and Jordan are now integrated with financial markets in the rest of the world. The author notes that shocks to the U.S. and U.K stock markets are diffused to the MENA region, but not to GCC stock markets. Assidenou (2011) investigates the cointegration properties of major capital markets indices during the 2008-2009 financial crisis. He finds that major Asian markets indices are cointegrated with U.S. and European market indices. He concludes that Asian capital markets will be under the influence of non-Asian capital markets even in the extreme case of not being entirely open to international investors. Parsva and Lean (2011) use cointegration and causality tests between exchange rates and stock indices in six MENA countries. They find that those markets are cointegrated during the recent global financial crisis. Swamy and Sreejesh (2011) use dynamic correlation and cointegration techniques to study the degree of co-movement between commodity and equity market indices after the global financial crisis. They find that the two markets have significant cointegration and exhibit strong co-movement especially after 2008. Finally, Rengasamy (2012) uses weekly data of 5 GCC markets from April 2009 to March 2012 to examine long run cointegrating relationship between them. His results reveal that the markets are not cointegrated. However, based on the mean returns and correlation analysis, he concludes that investors can reduce their risk and earn higher returns by choosing their investments correctly among the five markets.

Previous research suggests that dependencies exist between developed stock markets and most emerging markets. The level of integration between developed and emerging markets appears to be time varying and dependent on several factors. The degree of financial liberalization and market controls that exist in an emerging market plays an important role in the level of integration that exists between it and developed markets.

Data and Empirical Analysis

DATA

This study incorporates weekly closing price series from January 2000 to February 2012 of several stock markets within the MENA region (Egypt, Israel, Jordan, Kuwait, Malta, Oman, Qatar, Saudi Arabia, and Tunisia). The S&P 500 index is used as a proxy of United States financial market for the same period. Compounded week-to-week returns are calculated as the natural logarithmic differences in prices: $\ln(P_t/P_{t-1})$. All the price series are obtained from Datastream.

Figure 1: The Graphical Display of the Equity Price Indices of the Selected MENA Countries and the S&P 500 over the period of January 2000 to February 2012

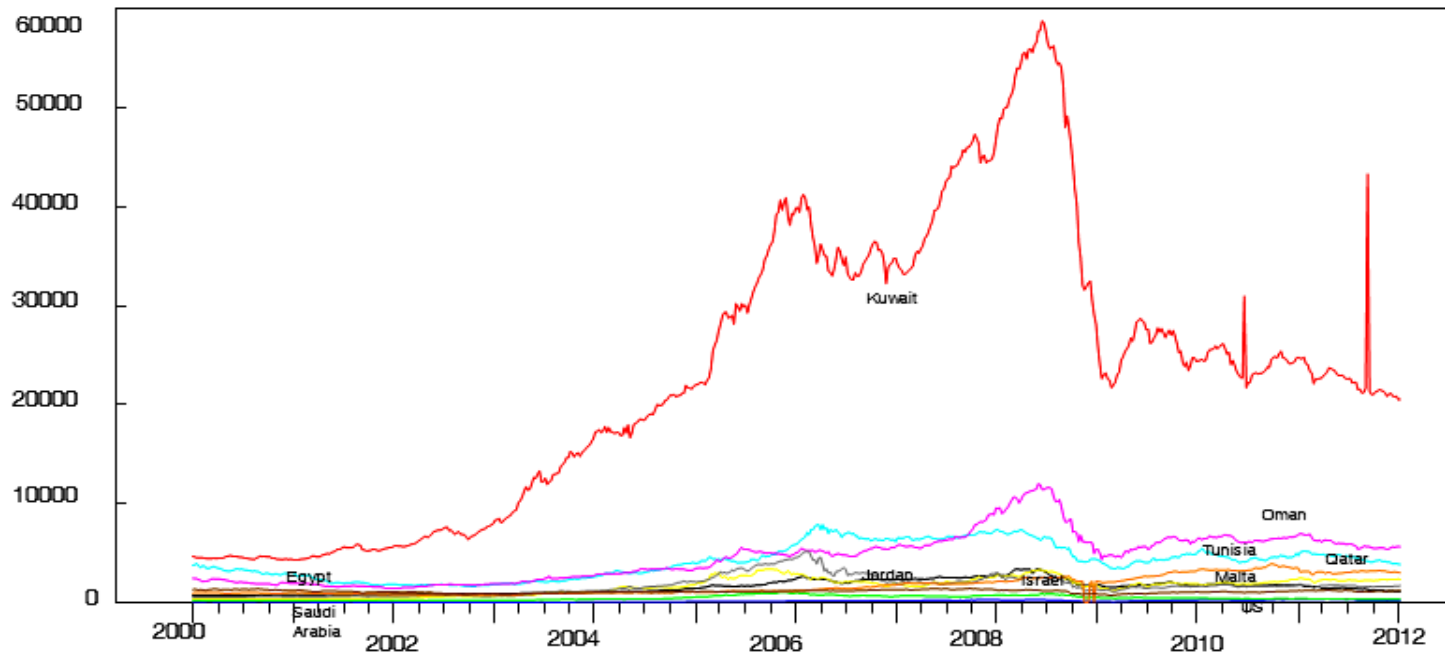


Figure 1 provides a graphical display of the behavior of the stock market indices of the selected nine MENA countries over the sample period. Figure 1 suggests cointegrating movements among these market portfolio price indices. The definition of the stock market indices is presented in Appendix A.

EMPIRICAL ANALYSIS

The Johansen (1988) cointegration test is implemented to test for the existence of a long run relationship between the MENA stock markets and the U.S. stock market. The augmented Dickey-Fuller (1979) and Phillip-Perron (1988) unit root tests are used to establish the non-stationarity of the series. The null hypothesis for both tests is that a unit root exists in the autoregressive representation of the series. The following regressions were employed:

$$P_t = \beta_1 + \beta_2 P_{t-1} + \sum_{i=1}^k \delta_i P_{t-i} + \varepsilon_t \quad (1)$$

where β_i , δ_i , are constant parameters; and ε_t is a stationary stochastic process. The number of lags (k) is determined based on the Akaike Information Criterion. To determine the order of integration of the series, equation (1) is modified to include first differences. That is,

$$\Delta P_t = \beta_1 + \beta_2 P_{t-1} + \sum_{i=1}^k \delta_i \Delta P_{t-i} + \varepsilon_t \quad (2)$$

To test for stationarity, the (ADF) and (PP) tests are applied to equations (1) and (2). The results are summarized in Table 1. The null hypotheses were $\beta_2 = 0$. Based on these results, it appears that the series are nonstationary in levels and are integrated of order one

The null hypothesis of an existence of a unit root in the MENA and U.S. price series could not be rejected at any conventional confidence level when equation (1) was utilized. When equation (2) was employed, the null hypothesis of a unit root was rejected at the 1 percent significance level for each MENA price series as well as the U.S. stock market. Thus, we conclude that weekly stock prices in the U.S. and MENA markets were I(1).

Table 1: The Augmented Dickey-Fuller (1979) and Phillip-Perron (1988) test results on MENA indices and the S&P 500 from January 2000 to February 2012.

Country	ADF unit root test		PP unit root test	
	Unit root $I(1)$?	t -statistic	Unit root $I(1)$?	t -statistic
Egypt	Yes	-22.211	Yes	-22.7075
Israel	Yes	-26.4148	Yes	-26.5096
Jordan	Yes	-24.1651	Yes	-24.7171
Kuwait	Yes	-36.0900	Yes	-34.2638
Malta	Yes	-15.2048	Yes	-25.9482
Oman	Yes	-6.0402	Yes	-9.3284
Qatar	Yes	-24.6711	Yes	-24.9933
Saudi Arabia	Yes	-23.0951	Yes	-23.9933
Tunisia	Yes	-12.0233	Yes	-42.2785
United States	Yes	-26.8431	Yes	-26.8291

All estimated t -statistics shown in this table are significant at the 1% level.

After establishing the existence of a unit root for each MENA market in the sample as well as the U.S. market, we then test for cointegration. The presence of a shared unit root between two price series implies the existence a long-run relationship between the series.

In order to apply the augmented VAR[$k+d(max)$] model, developed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996) (TYDL thereafter), the lag order of the original VAR(k) and the order of cointegration, $d(max)$, must be determined. As to the maximum order of integration of the time series in question, $d(max)$, we already conducted the ADF and PP unit root tests and the results are shown in Table 1. The lag order of the original VAR model, k , can be determined by using several lag order selection criteria such as the sequential modified LR test statistic (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC), and Hannan-Quinn information criterion (HQ). The results of the lag selection procedure are summarized in Table 2. The SIC and HQ collectively suggest using a lag of two. We will use VAR with lag length $k=2$ in the subsequent analysis.

Table 2: Maximum lag length results on MENA indices and the S&P 500
over the period of
January 2000 to February 2012.

Lag	Log L	LR	FPE	AIC	SIC	HQ
0	-44503.72	NA	6.86e+49	143.1309	143.2022	143.1586
1	-35334.81	18013.53	1.49e+37	113.9704	114.7544*	114.2751
2	-35097.15	459.2692	9.55e+36	113.5278	115.0245	114.1095*
3	-34929.95	317.7257	7.70e+36	113.3117	115.5211	114.1704
4	-34822.76	200.2583	7.53e+36	113.2886	116.2106	114.4243
5	-34739.30	153.2297	7.95e+36	113.3418	116.9765	114.7544
6	-34617.40	219.8816	7.43e+36	113.2714	117.6188	114.9610

LR denotes the sequential modified LR test statistic (each test at 5% level). FPE is the final prediction error. AIC, SIC and HQ denotes the Akaike information criterion, Schwartz information criterion, and Hannan-Quinn information criterion, respectively.

Engle and Granger (1987) showed a long-run equilibrium relationship may exist between two series that are integrated of order one, I(1). A brief review of cointegration and error correction is provided here (for a more complete overview, see Engle and Granger, 1987; Johansen and Juselius, 1990; Banerjee et al., 1993). Johansen and Juselius' (1990) multivariate cointegration model is based on the error correction representation given by:

$$\Delta X_t = \mu + \sum_{i=1}^{p-1} \Gamma_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \quad (3)$$

where X_t is an $(n \times 1)$ column vector of p variables, μ is an $(n \times 1)$ vector of constant terms, Γ and Π represent coefficient matrices, Δ is a difference operator, k denotes the lag length, and $\varepsilon_t \sim N(0, \Sigma)$. The impact matrix, Π , contains information about the long-run relationships. We calculate the trace test and the maximum eigenvalue test statistics using the residuals obtained from estimating equation (3). These tests are used to find the number of cointegrating vectors that exist in the data. We report the results in Table 3.

Table 3: Johansen and Juselius (1990) test results on MENA indices and the S&P 500 over the period of January 2000 to February 2012.

Number of cointegrating vectors	Trace Statistics	Max-Eigen Statistics
$r \leq 0$	335.9342**	104.4688**
$r \leq 1$	231.4654**	78.8183**
$r \leq 2$	152.6471	47.3899
$r \leq 3$	105.2572	31.9897
$r \leq 4$	73.2675	23.3769

** denotes significance at the 5% level.

The trace and maximum eigenvalue tests shown in Table 3 suggest the existence of, at most, one cointegrating vector. These results imply the existence of eight independent common, stochastic trends in a system of nine variables.

The TYDL model supplements the VECM technique because it allows for causal inference based on an augmented level VAR with integrated and cointegrated processes. We examine the dynamic causal relationships among the stock market indices of MENA countries and the U.S. by using the following VAR in level specification:

$$X_t = \mu + \sum_{i=1}^{p-1} \Gamma_i X_{t-i} + \varsigma_t \quad (4)$$

Where X_t is an $(n \times 1)$ column vector of p variables, μ is an $(n \times 1)$ vector of constant terms, Γ represents coefficient matrices, k denotes the lag length, and ς_t is *i.i.d.* and p -dimensional Gaussian error with mean zero and variance matrix Λ .

The TYDL procedure uses a modified Wald test for the restriction on the parameters of the VAR(k) model (Awokuse, 2005-a). This test has an asymptotic chi-squared distribution with k degrees of freedom in the limit when a VAR[$k+d(max)$] is estimated, where $d(max)$ is the maximum order of integration for the series in the system. Awokuse (2005-b) further explains the usefulness of the TYDL approach noting that prior knowledge about cointegration and testing for the existence of

a unit root are not necessary once the extra lags, i.e., $d(max)$ lags, are included. Given that $VAR(k)$ is selected, and the order of integration $d(max)$ is determined, a level VAR can then be estimated with a total of $p=[k+d(max)]$ lags. Finally, the standard Wald tests are applied to the first k VAR coefficient matrix (but not all lagged coefficients) to make a Granger causality inference.

Based on the above, we determine appropriate lag length $k = 2$ and the $d(max) = 1$, the Granger causality test results using both the VECM and the augmented level VAR specifications are reported in Table 4. The p-values obtained from Granger causality tests using the VECM specification are presented in Table 4.

Table 4: Granger causality test results obtained using vector error correction specification on MENA indices and the S&P 500 over the period of January 2000 to February 2012.

Dep. Variable	ΔEG	ΔIS	ΔJO	ΔKU	ΔMA	ΔOM	ΔQA	ΔSA	ΔTU	ΔUS
ΔEG	-	.074	.034	.216	.118	.014	.007	.093	.674	.067
ΔIS	.278	-	.632	.436	.640	.112	.166	.195	.804	.000
ΔJO	.089	.607	-	.012	.172	.000	.060	.128	.000	.018
ΔKU	.027	.007	.939	-	.647	.000	.241	.026	.029	.000
ΔMA	.018	.981	.305	.300	-	.939	.935	.000	.726	.000
ΔOM	.045	.240	.226	.063	.003	-	.004	.090	.000	.000
ΔQA	.045	.405	.091	.025	.626	.768	-	.229	.246	.000
ΔSA	.154	.825	.123	.415	.040	.038	.000	-	.344	.002
ΔTU	.848	.237	.161	.274	.666	.012	.049	.614	-	.025
ΔUS	.092	.834	.454	.560	.119	.522	.522	.166	.735	-

These results are obtained using the VECM specification. The null hypothesis is the independent series does not Granger cause the dependent series. The first column represents the dependent series used in each test. Each subsequent column represents independent series. For example, the p-value of .278 suggests that the change in the value of the Egyptian index (ΔEG) does not Granger cause changes in the value for the Israeli index (ΔIS).

Based on the p-values, the empirical results of the VECM reveal strong bidirectional Granger causalities between changes in equity indices or returns on market portfolios in (i) Oman and Egypt, (ii) Qatar and Egypt, (iii) Saudi Arabia and Malta, (iv) Tunisia and Oman. Bidirectional Granger causalities where the causality from the first country is stronger than the reverse direction exist between (i) Jordan and Egypt, (ii) US and Egypt, (iii) Oman and Kuwait, (iv) Oman and Saudi Arabia. Marginal causality exists between (i) Qatar and Jordan. These bidirectional Granger causalities indicate that returns on market portfolios in these countries are cointegrated, i.e., their movements affect one another, directly or otherwise.

Judging from the p-values, the results reveal strong unidirectional Granger causality or strong weak exogeneity from changes in equity indices or returns on market portfolios from the first to the second country of the following pairs: (i) Kuwait to Jordan, (ii) Oman to Jordan, (iii) Tunisia to Jordan, (iv) Egypt to Kuwait, (v) Israel to Kuwait, (vi) Saudi Arabia to Kuwait, (vii) Tunisia to Kuwait, (viii) Egypt to Malta, (ix) Malta to Oman, (x) Qatar to Oman, (xi) Kuwait to Qatar, (xii) Qatar to Saudi Arabia, (xiii) Qatar to Tunisia. The results also indicate weak causality from (i) Israel to Egypt, (ii) Saudi Arabia to Egypt.

Pairwise Granger causality estimation results between equity returns in each of the nine MENA countries and the U.S. S&P 500 stock price index indicate significant weak exogeneity from the return of the U.S. S&P 500, except for weak bidirectional Granger causality between equity markets in the U.S. and Egypt.

Table 5: Granger causality test results obtained using the TYDL specification on MENA indices and the S&P 500 over the period of January 2000 to February 2012.

Dep. Variable	EG	IS	JO	KU	MA	OM	QA	SA	TU	US
EG	-	.013	.030	.123	.174	.004	.012	.095	.506	.064
IS	.436	-	.552	.553	.485	.382	.036	.210	.562	.000
JO	.230	.766	-	.384	.312	.000	.022	.919	.000	.003
KU	.000	.006	.990	-	.916	.001	.381	.344	.006	.000
MA	.046	.215	.595	.559	-	.757	.518	.000	.479	.000
OM	.004	.320	.119	.491	.002	-	.002	.053	.000	.001
QA	.036	.183	.120	.048	.609	.693	-	.351	.094	.000
SA	.679	.720	.083	.810	.053	.035	.038	-	.236	.000
TU	.802	.027	.346	.429	.688	.001	.062	.135	-	.049
US	.168	.787	.539	.791	.105	.536	.521	.537	.808	-

The table shows the p-values obtained from the TYDL procedure. The null hypothesis is that the independent series does not Granger cause the dependent series. The first column represents the dependent series used in each test. Each subsequent column represents independent series. For example, the p-value of .436 suggests that the Egyptian index (EG) does not Granger cause the Israeli index (IS).

The cointegration tests based on augmented VAR model (TYDL procedure) using the levels of the equity indices [see Table 5] indicate that the Granger causality of equity indices in (i) Qatar to Jordan, (ii) US to Egypt and (iii) Oman to Kuwait were weakly exogenous from the first to the second country rather than bidirectional. Moreover, the TYDL procedure did not detect any Granger causality between (i) Kuwait to Jordan and (ii) Saudi Arabia to Kuwait. However, the cointegration tests based on the augmented VAR model and using the equity index levels reveal significant unidirectional causalities from (i) Qatar to Israel (ii) Jordan to Saudi Arabia, (iii) Israel to Tunisia, which establish their unidirectional Granger causalities. Additionally, the TYDL procedure also reveals bidirectional Granger causality between Tunisia and Qatar instead of a unidirectional causality as indicated by the VECM in Table 5.

Appendix A
Definition and Sources of the Data

Stock Market Index	Abbreviation	Source
Egypt	ΔEG	Thomson-Reuters Datastream Professional
Israel	ΔIS	Thomson Reuters Datastream Professional
Jordan	ΔJO	Thomson Reuters Datastream Professional
Kuwait	ΔKU	Thomson Reuters Datastream Professional
Malta	ΔMA	Thomson Reuters Datastream Professional
Oman	ΔOM	Thomson Reuters Datastream Professional
Qatar	ΔQA	Thomson Reuters Datastream Professional
Saudi Arabia	ΔSA	Thomson Reuters Datastream Professional
Tunisia	ΔTU	Thomson Reuters Datastream Professional
United States	ΔUS	Thomson Reuters Datastream Professional

CONCLUSION

The MENA region is home to some of the oldest stock exchanges in the world: Turkey (1866), Egypt (1890), Lebanon (1920) and Morocco (1929). Nevertheless, stock exchanges within MENA nations are best classified as emerging markets. MENA exchanges are still in their respective formative stages as reflected by market maturity, investor participation, institutional development and regulatory oversight. The combination of the 2007-08 financial crisis and political instability has served to further delay the development of the region's stock markets.

Our study analyzes the equity market indices and market portfolio returns in nine MENA nations and the U.S. for the presence of cointegration. Data from weekly MENA market indices is utilized to employ VECM and the augmented level VAR model with integrated and cointegrated processes of arbitrary orders developed by Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996). Granger causality tests based on the VECM suggest strong bidirectional Granger causalities between changes in equity indices or returns on market portfolios in (i) Oman and Egypt, (ii) Qatar and Egypt, (iii) Saudi Arabia and Malta, (iv) Tunisia and Oman; bidirectional Granger causalities where the causality from the first country was stronger than the reverse direction in (i) Jordan and Egypt, (ii) U.S. and Egypt, (iii) Oman and Kuwait, (iv) Oman and Saudi Arabia; and marginal causality in (i) Qatar and Jordan. These bidirectional Granger causalities indicate that returns on market portfolios in these selected countries were cointegrated, i.e., their movements affected one another, directly or otherwise.

Our results indicate strong unidirectional Granger causality from changes in equity indices or returns on market portfolios from the first to the second country of the following pairs: (i) Kuwait to Jordan, (ii) Oman to Jordan, (iii) Tunisia to Jordan, (iv) Egypt to Kuwait, (v) Israel to Kuwait, (vi) Saudi Arabia to Kuwait, (vii) Tunisia to Kuwait, (viii) Egypt to Malta (ix) Malta to Oman, (x) Qatar to Oman, (xi) Kuwait to Qatar, (xii) Qatar to Saudi Arabia, (xiii) Qatar to Tunisia. The results also indicate weak causality from (i) Israel to Egypt, and (ii) Saudi Arabia to Egypt.

Pairwise Granger causalities between equity returns in each of the nine selected MENA countries and the U.S. S&P 500 stock price index

indicate significant weak exogeneity from the returns of the U.S. S&P 500, except for weak bidirectional Granger causality between the equity market in the U.S. and Egypt. The Granger causality test based on the augmented VAR procedure yield largely similar results as VECM.

Our results indicate that the MENA markets appear to be cointegrated. We can attribute this level of cointegration to MENA region policy efforts to remove capital flow barriers and to provide financial market integration. The cointegration level can also be partly attributable to similarities in MENA country economic structure. Many of the countries within the region possess dominant oil and gas sectors with fixed exchange rate systems. This may lead to similar risk/return relationships within the region. Our findings also suggest that while MENA stock markets tend to co-move with the U.S. stock market, exchanges within the MENA region are not yet fully integrated with the U.S.

The lack of MENA-U.S. market integration is partly explained by the substantial differences in economic structure and economic policy which exist between the U.S. and the MENA region. Financial and political turmoil in the MENA region has also contributed to the lack of integration between the respective markets.

It should be noted that the database used for this study carries some limitations which may reduce the strength of the conclusions. The study uses end-of-week transactions price data as opposed to daily price data. Different MENA countries define “end-of-week” differently, i.e., the end-of-week may mean Thursday or even Wednesday as opposed to Friday for developed markets. Thus, market prices may be responding to different sets of information and different shocks on different dates. The empirical results may be strengthened with the use of daily market data on returns and dividends.

It should also be noted a high level of market co-movement does not imply that two markets are cointegrated. The economies of two countries could have no common trade or investment/financial links and still exhibit co-movement within their stock exchanges if both countries are exposed to common world or regional shocks. It does not necessarily follow that the same markets will be integrated. This explains the results showing significant co-movement and little or no integration between MENA stock markets and U.S. markets.

The international investor should understand that increased MENA market integration (between MENA region countries) will not always be beneficial to the investor. This financial integration will not always decrease the potential risk diversification for international portfolios. Investors should always consider the risk/return characteristics of their portfolios, including country or industry effects, and the extent of market co-movement over the course of the business cycle. In addition, low levels of integration with U.S. markets do not imply that domestic assets will enter international investor portfolios in order to achieve risk diversification. Market access may be limited due to significant remaining foreign investment barriers including cost of access, cost of information, and taxation. Competition from other markets with better risk/return characteristics may dominate low integration markets.

This study can be further extended to future projects designed to identify barriers to regional capital market integration. The elimination of these barriers will help the MENA stock markets to achieve sufficient minimum size, depth, and liquidity.

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