



Arab-U.S. Migration: How Do Oil Prices Influence People Flows?

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Abstract

The Arab Gulf region is unique as compared to other parts of the World because its economic livelihood depends greatly on World price of a particular export good – oil. The standard migration model is clear on the influence. We hypothesize that exchange rates, commodity prices and geopolitical instability can affect international migration. If migrants send their earnings to home, then appreciation of the destination country's currency will make remittances more valuable in the home country, raising the likelihood of migration. Higher commodity prices in the home country can, on the one hand, discourage migration because of improved labor market opportunities at home but on the other, encourage migration because greater prosperity makes relocation more affordable. Some parts of the World, for example the Middle East, have experienced considerable geopolitical instability, which may have induced greater levels of supply-push migration to more stable parts of the World. Our test case is the migration of persons from the Arab region to the USA during 1992-2004, a period characterized by volatility in Arab-U.S. exchange rates, oil prices and political conditions. We estimate a fixed effects model of the Arab emigration rate using a sample of 182 observations, which includes 14 countries (10 Arab and 4 others in a control group). One of our control variables is the real relative return to remittances, which is the ratio of the exchange rate-adjusted real wage in the USA to the exchange rate-adjusted real wage in the UK. Our econometric results demonstrate that: (i) Arab demand for U.S. visas is positively and significantly related to the real return to remitting, although the relationship is stronger for total visa demand than for employment visa demand; (ii) A one-dollar increase in the real price of oil from its mean will increase the flow of Arab migrants to the USA by over 505 persons; (iii) For every Arab who has migrated in the past, roughly 5 persons will follow him; and (iv) While the 9/11 terrorist attacks ceteris paribus stimulated migration, the 2003 Iraq-American war dampened it.

Keywords: Oil Price, Migration, Migrant Remittance, Brain Drain, Source Country, Liquidity Constraints

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1. INTRODUCTION

There is now a large and multi-disciplinary literature on migration from developing to developed countries. Some of these studies focus on the “Brain Drain,” i.e. the international transfer of human capital from developing to developed countries,ⁱ while others focus on migrant remittances,ⁱⁱ illegal migrationⁱⁱⁱ and migration as part of a family’s decision to ease liquidity constraints.^{iv} The prevailing theme in this literature is that the “South to North” movement of human capital is driven by differential economic opportunities, migration costs, network effects,^v immigration policies^{vi} and household liquidity constraints in the source country.^{vii} Empirical work in this area has often been hampered by lack of source country data.

Generally overlooked in this literature are the potential influences of exchange rates, commodity prices and geopolitical instability on the volume of migration flows. If international migrants remit their earnings back home, appreciation (depreciation) of the destination country’s currency will make remittances sent home more (less) valuable and may boost (lower) the likelihood of migration. While there is recent work on how exchange rate uncertainty affects remittances (Higgins, Hysenbegasi and Pozo (2004), for example), the relationship between exchange rates and the volume of migration flows has not been explored. Some parts of the developing World, e.g. Africa, Latin America and the Middle East, have been sources of geopolitical instability, yet very little is known about how such instability affects the volume of migration flows to the developed World.^{viii} In some parts of the developing World, commodity prices exert major effects on source country economies. For example, the economies of various African countries are very sensitive to fluctuations in World crop prices and changes in the World price of oil exert major effects on economies in the Arab region. How do fluctuations in commodity prices affect migratory outflows to the developed World? On the one hand, the prosperity at home brought about by higher commodity prices could make international migration less attractive, while on the other this prosperity could make migration more affordable. The linkage between commodity prices and international migration flows is generally not understood.

In this study, we examine the effects of exchange rates, geopolitical instability and commodity prices on international migration from Developing to Developed Countries. Our test case is migration from the Arab region to the USA, a case which has received virtually no attention in the economics of migration literature^{ix}, but which is ideal for analyzing the effects of exchange rates, geopolitical events and commodity prices on migration.

The Arab test case is particularly interesting for migration researchers because of a confluence of factors, some internal to the region and others that are geopolitical in nature but strongly associated with the region. First, the population of the Arab region has grown rapidly. The region’s population totaled about 284 million in 2000 and has grown rapidly over the past thirty years.^x Second, Arab nations differ greatly in their natural resource endowments, particularly oil.^{xi} Volatility in the price of oil over the last forty years has had significant effects on internal and international migration of labor in the entire Arab region.^{xii} Third, Arab countries, particularly the oil-producing states, have been important destinations for migrant remittances.^{xiii} Fourth, some Arab countries have become increasingly reliant on external migration, particularly to the U.S. and Europe. With unemployment rates for some countries averaging close to 20% and with youth unemployment rates close to 40%, increasing labor mobility has traditionally been the only effective means by which to combat poverty and high unemployment in the region.

Two other important factors contribute to making the Arab test case a worthwhile focus of inquiry. First, the 1991 Gulf War, the September 11, 2001, terrorist attacks on the World Trade Center in New York City and the onset of the Iraq-American War in 2003 may have disrupted long-term Arab external migration patterns. For example, because the 9/11 terrorists came from the region and there were frequent reports of discriminatory behavior towards Arabs living in the U.S. in the aftermath of the attacks, prospective Arab migrants may have been deterred from relocating to the U.S. due to fear of increased prejudice and anger towards them by Americans, as well as substantially increased surveillance by U.S. immigration and law enforcement authorities. On the other hand, the rise of a very conservative brand of Islam in the Arab region following the 9/11 attacks may have encouraged less conservative practitioners of Islam to migrate to the West. Second, exchange rates between some of the Arab countries and the U.S. have been extremely volatile since the early 1990s.^{xiv} Since many migrants are known to remit earnings back home, gyrations in the exchange rate will affect the value of remittances in the source country's currency and thus the decision to migrate.

We estimate an expanded model of rates of Arab migration to the USA using annual data for 10 Arab countries (7 oil-producing and 3 non-oil producing) and 4 non-Arab countries for the period 1992-2014. The non-Arab countries were included to control for World-wide macro economic conditions and trends in international migration. We hypothesize that admissions of Arab migrants will depend upon real income differences, exchange rates, real oil prices, past flows of migrants from the Arab region to the USA, opportunities in the U.K. labor market, U.S. immigration policy and political instability in the Arab region. One novel variable included in the model is the exchange rate-adjusted ratio of real wages in the USA to real wages in the UK, which measures the real relative return to remitting U.S. income back home.

2. AN EXPANDED MIGRATION MODEL

We estimate an expanded version of the traditional migration model, building upon the work of Sjaastad (1962), Todaro (1969), Greenwood and McDowell (1991) and Hatton and Williamson (2002), to name a few prominent studies. Our model specifically extends the work of: (1) Clark, Hatton and Williamson (2002), who relate rates of international migration flows to the USA to real income differences, U.S. immigration policy, migration costs and various social indicators of the source and receiving countries; and (2) Greenwood and McDowell (1991), who relate migration rates to real income differences, the relative costs of transferring occupational skills, development and political conditions in the source country and various institutional control variables. Our model, however, includes three variables not found in these and earlier international migration studies - exchange rates, commodity prices in the source region and real earnings opportunities in an alternative destination.

We estimate the following fixed effects model of the emigration rate:

$$(1) \left(\frac{M}{POP} \right)_{it} = \beta_0 + \beta_1(COSTS)_{it} + \beta_2 \left[\frac{\left(\frac{W_A}{X_A} \right)_{it}}{\left(\frac{W_B}{X_B} \right)_{it}} \right] + \beta_3 OIL_t + \beta_4 \left(\frac{M}{POP} \right)_{i(t-k)} + \beta_5 (INCOME)_{it} + \beta_6 CRISIS_t + \beta_7 POLICY_t + \sum_{i=1}^j (\alpha_i COUNTRY_i + \delta_i (OIL_t)(OILCOUNTRY_i)) + \varepsilon_{it} ,$$

where i denotes source country and t denotes the period during which a migration flow takes place. In the above equation M is the number of persons migrating, POP is population of the source country, $COSTS$ is a measure of the affordability of relocating to the destination country relative to that of an alternative destination, X_A is the nominal price of the source country's currency in units of destination country A's currency, X_B is the nominal price of the source country's currency in units of alternative destination country B's currency, W_A is the real wage in A, W_B is the real wage in B, OIL is the real World price of oil, $\left(\frac{M}{POP}\right)_{t-k}$ is the emigration rate k

periods earlier (a measure of past migration flows), $INCOME$ is real income available to the migrant if he stays in his home country, $CRISIS$ is a vector of dummies equaling one if a geopolitical event relating to the source country or region is in effect, $POLICY$ is a vector of dummies equaling one if there are immigration policies in the destination country that are capable of affecting migration flows from the source country, $COUNTRY$ is a dummy equaling one for the source country and $(OIL)(OILCOUNTRY)$ is an interaction between the oil price and a dummy equaling one if the source country is an oil-producing country, β_0 is an intercept and ε is a classically well-behaved error.

The $COSTS$ term is hypothesized to have a positive relationship with the emigration rate ($\beta_1 > 0$) and is measured in two different ways. First, we use the ratio of exchange rates, (X_A/X_B) . If destination country A's price of the source country's currency rises relative to alternative destination country B's price of the source country's currency, then migration to A will rise.^{xv} Second, we create a *relative affordability ratio* that takes into account both exchange rates and

distances in air miles. This ratio is $\left[\frac{\frac{X_A}{DISTANCE_A}}{\frac{X_B}{DISTANCE_B}} \right]$, where $DISTANCE_A$ is air miles from the

source country to destination country A and $DISTANCE_B$ is air miles from the source country to alternative destination country B. If A's price of the source country's currency rises, for example, then the affordability of migration to A rises relative to the affordability of migration to B, encouraging more migration to A.

The hypothesized relationship between the emigration rate and the ratio of the exchange rate-adjusted real wage in destination country A to the exchange rate-adjusted real wage in alternative

destination country B, $\left[\frac{\left(\frac{W_A}{X_A}\right)_{it}}{\left(\frac{W_B}{X_B}\right)_{it}} \right]$, is positive ($\beta_2 > 0$). There are two reasons for this hypothesized

relationship. First, this ratio accounts for the economic advantage of migrating to A relative to B; if the real wage in A, rises, then *ceteris paribus* its labor market becomes more attractive and there will be a stronger incentive to migrate there. Second, assuming that a migrant remits part of his wage income back home, because we are adjusting the relative real wage by the relative exchange rate, the ratio in brackets above also measures the *real relative return to remittances*.

The real relative return to remittances variable is best illustrated by example. Suppose destination country A is the U.S. and alternative destination country B is the U.K. Then the ratio $\left(\frac{W_A}{X_A}\right)$ equals the migrant's purchasing power in the U.S. expressed in units of his home country's currency, as well as the amount of his U.S. remittances spent by family and friends back home. In contrast, the denominator $\left(\frac{W_B}{X_B}\right)$ equals the migrant's purchasing power in the U.K. expressed in units of his home country's currency, as well as the amount of U.K. remittances spent by family and friends back home. If $\left(\frac{W_A}{X_A}\right)$ rises relative to $\left(\frac{W_B}{X_B}\right)$, then the value of U.S. remittances received by family and friends back home rises relative to the value of U.K. remittances received. Consequently, remitting one's wage income earned in the U.S. will be viewed as more attractive and this, all other things equal, will encourage more migration to the U.S. In contrast, if $\left(\frac{W_A}{X_A}\right)$ falls relative to $\left(\frac{W_B}{X_B}\right)$, the value of U.S. remittances will fall relative to the value of U.K. remittances and this will discourage migration to the U.S.

We hypothesize that the World price of oil (OIL) is capable of affecting the emigration rate in several different ways. On the one hand, higher oil prices bring prosperity to the region; oil-induced prosperity in the oil-producing states will stimulate the demand for goods made in the non-oil-producing states, increased tourism by oil-producing state residents in the non-oil-producing states and increased remittances sent home by oil workers who migrated from the non-oil-producing states. Because of improved labor market opportunities in the region, migration abroad will tend to be less attractive. Furthermore, higher oil prices are very likely to encourage internal migration to the oil-producing states, which should also contribute to less international migration. *Ceteris paribus*, both these effects should lead to a negative sign on the β_3 coefficient. On the other hand, oil-driven prosperity is likely to make long distance international migration more affordable, which *ceteris paribus* should raise the emigration rate. Consequently, the sign of β_3 will depend upon which of these two effects dominates.

There is an additional hypothesized effect of oil prices; higher oil prices will stimulate the demand for native workers in the oil-producing countries, which will discourage international migration by those workers. This effect is captured separately in the (OIL)(OILCOUNTRY) interaction term and we hypothesize a negative sign.

Following previous models of migration, the higher are flows of migrants from the source country to the destination country in a earlier periods (the higher is $\frac{M}{POP}$), the greater will be the emigration rate ($\beta_4 > 0$); pecuniary and non-pecuniary migration costs will be lower when migrants have more extensive family ties and immigrant enclaves are larger in the destination

country. Also consistent with previous models, the greater are real income opportunities in the country of origin (the higher is INCOME), the lower will be the emigration rate ($\beta_5 < 0$).

3. A TEST OF THE ARAB MIGRATION MODEL

3.1 Choice of sample countries

Economic studies of the Arab region are often severely constrained by lack of available data, particularly for certain countries. The quantity and quality of data-gathering by Arab governments differ significantly. Some countries have only recently begun making accurate and continual time series available to researchers, for example, and in some countries there have been lengthy gaps in data-gathering due to war or budget constraints. Consequently, we were constrained to only sample a subset of countries in the region and only on data since the early 1990s.

In choosing our subset of countries, we used three criteria: (i) so that we could test for the effects of changes in oil prices on emigration to the U.S., part of the sample had to come from the oil-producing part of the region; (ii) so that we could test for the effects of Arab-related geo-political shocks on emigration to the U.S., part of the sample had to include observations from countries that have been associated with geo-political instability, e.g. war and domestic political shocks; and (iii) all the countries in the sample had to have experienced relatively significant, but differing, levels of international emigration, particularly to the U.S.

Ten countries satisfied these criteria -- Iraq, Jordan, Lebanon, Egypt, Kuwait, Morocco, Saudi Arabia, Syria, United Arab Emirates (UAE) and Yemen. All these countries contributed significantly to migration in the Arab region, both internally and internationally. Seven are oil-producing (Iraq, Egypt, Kuwait, Saudi Arabia, Syria, UAE and Yemen) and some have experienced internal political turmoil since the early 1990s, e.g. Iraq, Lebanon, Kuwait, Syria and Yemen. Iraq is obviously a standout case because it is an oil-producing state that has recently experienced tremendous political turmoil. Now I.S. is led by Bagdadi is projecting himself as very powerful as Islamic leader.

To control for World-wide economic and socio-political trends that may have affected international migration from the Arab region, we also included in our sample, 4 non-Arab countries. This subset includes India, Thailand, South Africa and Argentina. Like the Arab sub-sample, these four are developing countries that have provided continual, but not substantial, flows of migrants to the USA. None of them are oil-producing and they have not experienced the severe exchange rate volatility that some of the Arab countries have experienced. Each country was selected from a different region of the World, so as to allow for variation in migration costs.

3.2 Description of variables and data

Our pooled sample consists of annual data beginning with 1992 and ending in 2014 and includes 182 observations. The dependent variable is the emigration rate. Because the U.S. immigration policy distinguishes between different classes of admission, we distinguish between the employment emigration rate (U.S. employment visas issued from persons whose last permanent country of residence was the source country divided by its population) and the total emigration rate (total visas issued from persons whose last permanent country of residence was the source country divided by its population). All data on immigrant admissions were obtained from the *Yearbook of Immigration Statistics* (formerly the *Statistical Yearbook of the Immigration and*

Naturalization Service), published by the U.S. Bureau of Citizenship and Immigration Services (BCIS), now part of the U.S. Department of Homeland Security.^{xvi} Visa data from 1995 to 2002 were obtained from the BCIS's website,^{xvii} while the data for earlier years were obtained from the *Statistical Yearbook*. It should be noted that the employment visa data include spouses and children of individuals who were issued employment visas. Data on source country populations were obtained from the online version of the *Handbook of Statistics 2005* and published on the UNCTAD (United Nations Conference on Trade and Development) website.^{xviii}

The independent variables used in our regressions were constructed from the following measures:

1. *Real hourly U.S. wages*. These are measured as hourly earnings of production or non-supervisory workers on private non-farm payrolls, adjusted by the Consumer Price Index (CPI). The nominal hourly earnings data were obtained from the U.S. Bureau of Labor Statistics website^{xix} and the CPI data were obtained from the online version of the 2004 *Economic Report of the President*;^{xx}
2. *Real wages in the U.K.* This is the proxy for real earnings opportunities in the alternative destination country. We chose not to use a member of the European Union (EU) as the alternative destination country because EU countries switched to the Euro in the later part of the sample period. The resulting structural change in their currencies could potentially bias estimates of the effects of changes in exchange rates on migration. We chose, therefore, the U.K. as the alternative destination, which historically has been the most popular destination in Europe for migrants from the Arab World.^{xxi} We used the *average earnings index* for the U.K., adjusted by the U.K. CPI. Data for both the nominal earnings index and CPI were obtained from the U.K.'s *National Statistics* website;^{xxii}
3. *Real per capita GDP in each of the source countries*. This proxies the source country real income variable (INCOME). There are no continual wage series for any of the source countries available for our chosen sample period, so we chose to proxy the real wage available in each country by real per capita GDP. We took data on per capita nominal GDP for each source country, obtained from the online version of the UNCTAD *Handbook of Statistics 2005*, and adjusted them by each country's CPI. CPI data were obtained from *LABORSTA Internet*, the online database published by the International Labor Organization;^{xxiii}
4. *The stock of previous immigrants from the source country*. Previous migration flows from the source country were measured by the ratio of U.S. residents born in the source country to the source country's population. For the years 1992-99 we used the ratio of residents persons born in the source country as of the 1990 decennial census to source country population in each of those years. After 1999, we used the ratio of residents born in the source country as of the 2000 census to source country population in each year;^{xxiv}
5. *The exchange rate between the source country's currency and: (a) the U.S. dollar; and (b) the British pound*. The exchange rate is measured as the U.S. dollar (British pound) price of one unit of the source country's currency.^{xxv} U.S. exchange rate data were obtained from *International Financial Statistics*, published by the International Monetary Fund. British exchange rate data were obtained from the website of Her Majesty's Revenue and Customs Department;^{xxvi}

6. *The real OPEC price of crude oil.* We used the average nominal spot price of OPEC crude oil for each year, adjusted by the CPI in the source country. Nominal oil price data were obtained from the online versions of the OPEC *Annual Statistical Bulletin* for 2005;^{xxvii}
7. The distance in air miles from the source country to the USA, as well as to the U.K. This information was obtained from the website, www.indo.com.^{xxviii}
8. *Dummy variables for geo-political events relating to the Arab region.* We used dummies to control for effects that the 9/11 terrorist attacks and the onset of the Iraq-American War in 2003 may have had on the number of Arab migrants migrating to the U.S. The former dummy equals one for the years 2001-04, zero otherwise, and the latter dummy equals one for 2003, zero otherwise;
9. *A dummy variable for major changes in U.S. immigration policy.* We included two dummies to control for three acts of Congress during the sample period that may have influenced migration from the 14 source countries to the U.S. The first dummy equals one for the years beginning in 1996 and controls for the effects of the *Illegal Immigration Reform and Immigrant Responsibility Act* of 1996 and the *Personal Responsibility and Work Opportunity Reconciliation Act* of 1996. Both acts were intended to raise the cost of illegally migrating to the U.S., hence we hypothesize a negative sign on β_7 .^{xxix} The second dummy equals one for the period 2000-2003, a period during which Congress raised the limit on the number of H-1B visas that could be issued to immigrants.^{xxx} The higher quota for these visas may have encouraged more migration to the U.S., hence we hypothesize a positive coefficient on this dummy;
10. *Source country dummies.* There may be differences in migration patterns to the USA between the countries not captured by the above explanatory variables. These could include differences in income inequality, schooling and other human capital endowments, demographics and quality of life. By including source country dummies we control for any such differences, particularly since reliable data for the region on many socio-economic indicators are difficult to obtain or non-existent.

Finally, we interacted the real price of oil with a dummy equaling one if the source country was an oil-producing one. This was intended to control for internal migration between the oil-producing and non-oil-producing Arab states in response to a change in the World price of oil. Table 1 shows descriptive statistics for the dependent and selected independent variables. Total annual admissions from each of the fourteen countries to the U.S. averaged 6,207, with employment visas averaging approximately 24% of the total. The number of employment visas issued to migrants from the Arab region was very small, averaging only 259 each year, whereas total visas issued to Arab migrants averaged 2,513 (approximately 40% for the sample of countries). This illustrates that the bulk of immigrant admissions to the USA from Arab countries are granted on the basis of criteria other than employment, e.g. family ties, refugee or asylum status. Note also that real per capita GDP in the source countries averaged only U.S.\$4,574, but varied considerably across countries and over time, since the coefficient of variation is approximately 130%. The stock of previous immigrants from the source country residing in the U.S. averaged slightly over 0.5% of source country population during the sample period. U.S.-Arab and U.K.-Arab exchange rates were quite volatile during the period, as was the real price of oil volatile.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Total visas issued by U.S. authorities	6,207	12,055	534	66,864
Employment emigration rate	1,510	5,154	10	39,793
Real relative return to remittances	14.586	63.179	0.0096	362.57
Real hourly U.S. wage	\$7.95	\$0.27	\$7.63	\$8.34
Average real earnings index in U.K.	90.20	8.42	80.31	104.96
Stock of previous immigrants from source country residing in U.S.	105,260	231,780	1,656	1,369,100
Real per capita GDP in source country (in U.S. dollars)	\$4,573.60	\$5,917.20	\$9.39	\$23,768.00
U.S. Exchange rate	\$0.49	\$0.88	\$0.000507	\$3.41
U.K. Exchange Rate	0.00453 Pounds	0.00151 Pounds	0.00033 Pounds	2.2635 Pounds
Real price of OPEC oil (in U.S. dollars)	\$20.53	\$10.61	\$0.39	\$93.13
Sample size	182			

Estimated regression results

Table 2 shows coefficient estimates for Ordinary Least Squares regressions of total and employment emigration rates. Equations I and II include the exchange rate ratio as the proxy for relative migration affordability, whereas the other two equations include the relative affordability ratio described earlier. All coefficient estimates are corrected for heteroskedasticity using White’s heteroskedasticity-consistent covariance matrix. In our discussion below, since many of the coefficient estimates are extremely small numbers due to the extremely small emigration rates from many of the source countries, we provide interpretations using mean values of source population and the various independent variables as base values.

**Table 2: Coefficient Estimates of emigration rate equations
(t-ratios in parentheses; boldface indicates significant at 10% or better)**

VARIABLE	I Total emigration rate	II Employment emigration rate	III Total emigration rate	IV Employment emigration rate
Exchange rate-adjusted real wage ratio	0.00000019 (2.83)	0.000000037 (1.89)	0.00000020 (2.50)	0.000000029 (1.30)
Exchange rate ratio	0.000049 (0.77)	0.000066 (3.91)		
Relative affordability of			0.000012	-0.000002

migration			(0.34)	(-0.66)
Real GDP per capita	-	-	-0.000000005	-0.000000045
	0.000000007	0.000000075	(-0.69)	(-2.20)
	(-0.98)	(-4.04)		
Real price of oil	0.0000054	0.0000011	0.0000052	0.00000086
	(2.027)	(2.91)	(1.98)	(2.33)
Past immigration	0.0409	0.0048	0.0427	0.0072
	(2.02)	(0.71)	(2.22)	(1.11)
Post 9/11 Period Control	0.000037	0.000022	0.000038	0.000023
	(1.75)	(3.40)	(1.77)	(3.37)
Iraq war control	-0.000094	-0.000021	-0.000098	-0.000025
	(-3.47)	(-2.89)	(-3.56)	(-3.80)
IIRIA and PRWOR Acts	-0.000062	-0.000013	-0.000064	-0.000014
	(-2.94)	(-2.82)	(-2.92)	(-3.47)
HB1 Quota Control	-0.000075	-0.000022	-0.000074	-0.000021
	(-3.2)	(-3.44)	(-3.18)	(-3.25)
Iraqi dummy	0.00002	-0.000041	0.000032	-0.000041
	(0.26)	(-1.74)	(0.37)	(-2.47)
Jordanian dummy	0.00055	-0.00010	0.00061	-0.000031
	(4.01)	(-3.33)	(4.26)	(-0.67)
Lebanese dummy	0.000017	-0.000018	-0.000025	-0.000081
	(0.03)	(-0.20)	(-0.05)	(-0.46)
Egyptian dummy	0.00008	-0.000024	0.000094	-0.000021
	(0.94)	(-0.65)	(0.98)	(-1.52)
Kuwaiti dummy	0.00012	-0.00037	0.00046	0.000071
	(0.26)	(-3.09)	(3.34)	(1.65)
Moroccan dummy	0.00003	-0.000041	0.000037	-0.000035
	(0.88)	(-3.97)	(1.07)	(-5.63)
Saudi dummy	0.00011	-0.000004	0.00011	-0.000013
	(1.66)	(-0.17)	(1.59)	(-0.88)
Syrian dummy	0.00008	-0.00001	0.000076	-0.000014
	(0.97)	(-0.43)	(0.93)	(-0.77)
UAE dummy	0.00039	0.00003	0.00036	-0.000012
	(3.05)	(0.74)	(2.80)	(-0.28)
Yemeni dummy	0.00018	-0.000019	0.00018	-0.000014
	(2.60)	(-0.95)	(2.54)	(-1.32)
Indian dummy	-0.00003	-0.000036	-0.000023	-0.000028
	(-1.01)	(-3.25)	(-0.74)	(-3.39)
Thai dummy	0.0001	-0.000036	0.00009	-0.000035
	(1.34)	(-3.59)	(1.23)	(-3.45)
Argentinian dummy	-0.00004	-0.000019	-0.000025	-0.000008
	(-0.81)	(-1.41)	(-0.56)	(-0.06)

Iraq x Real oil price	-0.000004 (-1.42)	-0.000001 (-1.22)	-0.0000037 (-1.39)	-0.00000081 (-2.16)
Egypt x Real oil price	-0.000004 (-1.03)	-0.000008 (-0.50)	-0.000004 (-1.00)	-0.0000006 (-1.06)
Kuwait x Real oil price	-0.00001 (-1.45)	0.0000025 (1.65)	-0.000011 (-1.81)	0.0000007 (0.31)
Saudi x Real oil price	-0.0000008 (-0.23)	0.0000013 (1.12)	-0.0000009 (-0.25)	0.0000012 (1.42)
Syria x Real oil price	-0.000003 (-0.95)	-0.0000009 (-0.70)	-0.0000032 (-0.95)	-0.0000008 (-1.52)
UAE x Real oil price	-0.0000002 (-0.09)	0.0000063 (4.35)	-0.0000003 (-0.12)	0.0000061 (4.24)
Yemen x Real oil price	-0.000006 (-2.08)	-0.0000012 (-1.75)	-0.0000058 (-2.00)	-0.000001 (-2.65)
Constant	0.000005 (2.03)	0.0000038 (2.29)	-0.0000031 (-0.40)	0.0000034 (3.34)
Adjusted R ²	0.9057	0.7846	0.9056	0.7638
Sum of squared errors	0.0000018	0.00000008	0.0000018	0.00000009
Sample size	182	182	182	182

Our most important result, which is robust across all four specifications, is that the demand for U.S. visas is positively related to the real relative return to remittances. The relationship is not as strong for employment visa demand. However, according to equation I, if the exchange rate-adjusted real wage ratio rises by one point from its mean of 14.59 to 15.59 (an increase of 6.85%), total admissions to the U.S. rise by 18 persons. While this effect is small, it is significant at better than 1%. According to equation II, a one-unit increase in the real relative return to remittances will, all other things equal, increase employment admissions by approximately 3 persons. Similar size predictions are implied by equations III and IV. All four equations strongly confirm our hypothesis that a *ceteris paribus* change in the expected return to remitting a migrant's income back home does indeed influence the amount of U.S. migration.

Equations I to IV suggest that relative relocation costs appear not to matter in the migration decision.^{xxxi} However, increases in real income in the source country (measured by per capita real GDP) are predicted to reduce the volume of employment admissions, but not the volume of total admissions. According to equation II, for example, a \$1,000 increase in the source country's real per capita real GDP from its mean value of \$4,574 will induce *ceteris paribus* a drop in employment admissions of approximately 700 persons. The significance of this variable for only the employment admissions equations does not surprise us, for we would expect that economic conditions in the source country would be considerably more important for persons migrating strictly in response to differences in labor market opportunities. Persons migrating primarily for non-economic reasons, who comprise more than 75% of all Arab migrants to the USA, are likely to be much less sensitive to differences in labor market opportunities.

All four equations strongly confirm the model's prediction that changes in the World price of oil will affect U.S. admissions. According to equation I, for example, a one dollar increase in the real price of oil from its mean value of \$20.53 is predicted to cause total U.S. admissions to rise by approximately 505 persons annually, whereas equation II predicts that employment admissions will rise by 103 persons. These findings indicate that the main reason for why oil prices affect

emigration is because higher prices on balance make long distance international migration more affordable.

Past migration flows are found to influence total admissions to the U.S., but not employment-related admissions. Equations I and III predict that for every person who has migrated from the source country in the past, approximately 4-5 persons will follow him later. Ties to family and friends in the host country would be expected to matter most to migrants motivated by reasons other than differences in economic opportunities between source and host countries. This is exactly what our results appear to confirm.

Geo-political events and source country policy changes all appear to affect total and employment admissions. Emigration rates were *ceteris paribus* higher following the 9/11 terrorist attacks, but lower following the onset of the 2003 Iraq-American War. According to equation I, for example, the coefficient on the 9/11 dummy predicts that *ceteris paribus* total admissions rose by 3,461 persons following the terrorist attacks, but fell by 8,794 persons following the onset of the War. According to equation II, employment admissions rose *ceteris paribus* by 2,058 persons following the terrorist attacks, but fell by 1,965 persons following the onset of the War.

U.S. legislation which raised the costs of illegally migrating to the U.S. appears to have had the intended effects on both total and employment admissions to the U.S. Across all four equations, the two Congressional acts signed into law in 1996 contributed to lowering total and employment emigration rates by significant amounts. However, increases in the quota of H-1B visas appear to have lowered emigration rates, contrary to our model's prediction. Finally, our results indicate some evidence that higher oil prices may have triggered internal migration to oil-producing states. The estimated coefficients on the oil price^x country dummy interactions are negative and significant for some of the oil-producing countries, more so for employment admissions.

4. CONCLUDING REMARKS

We conclude that in addition to the traditional factors affecting international migration, emigration from the Arab World to the U.S. is significantly influenced by three factors - geo-political instability associated with the region, exchange rates and the price of oil. Specifically, we obtained two striking results in this study. First, migration flows from the Arab region to the U.S. depend upon the relative real value of remittances sent home. This strongly supports the view of the *New Economics of Migration* that migration from the Developing to the Developed World is fundamentally a family decision and that remittances are used by families as an instrument of self-insurance. This finding also implies a strong linkage between exchange rates, migration flows and the contribution of remittances to foreign direct investment in the Arab region. Second, we find that higher oil prices appear to stimulate, not discourage, U.S. migration. This suggests that a strengthened oil market does not based on balance that appear to lead to a substitution of internal for external Arab migration. Instead, higher oil prices may have had the effect of making U.S. migration more affordable. Finally, emigration rates were found to be higher after the 9/11 terrorist attacks, controlling for other factors, suggesting that the attacks did not impose spillover costs on prospective Arab migrants.

We find that total emigration rates were lower during the first year of the Iraq-American War, all other factors held constant. Furthermore, emigration to the U.S. has been significantly influenced by family ties and enclave effects, real earnings opportunities in the U.S. and Europe and real per capita output in the Arab region. Recent U.S. policies aimed at controlling illegal immigration appear to have lowered emigration rates from the Arab region.

Our findings have important implications for further study of emigration from developing to developed countries. For example, African emigration to the U.S. and Europe is likely also to have been influenced by commodity prices, exchange rates and regional political events. The same

story is likely to be the case for emigration to the U.S., Canada and Europe from the former Soviet Union, South America and developing Asia. It will be interesting to see whether the results we obtained, particularly for exchange rates, oil prices and political events, are replicated for these other regions of the World.

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6. FOOTNOTES

ⁱ See, for example, recent work by Beine, Docquier and Rapoport (2001, 2003) and Domingues Dos Santos and Postel-Vinay (2003).

ⁱⁱ See recent work by McCormick and Wahba (2000) and Rapoport and Docquier (2003).

ⁱⁱⁱ See Chiswick (1988), Hill and Pearce (1990) and Cobb-Clark, Shiells and Lowell (1995).

^{iv} See Stark and Levhari (1982), Stark (1984) and Katz and Stark (1986).

^v Network effects are the ties that a prospective migrant has to family, friends and business associates in the receiving country. These effects are generally stronger the greater is the number of previous migrants residing in the receiving country and, more specifically, the size of an immigrant enclave in a particular region or city.

^{vi} For two studies that provide a thorough treatment of the effects of receiving country immigration policies, see Greenwood and McDowell (1991) and Hatton and Williamson (2002).

^{vii} See the *The Economics of Migration*, Vols. I-IV, edited by Klaus F. Zimmerman and Thomas K. Bauer, Edward Elgar, 2002, for a very comprehensive collection of papers on all aspects of the subject. Another worthwhile, more multidisciplinary, survey is Douglas S. Massey, *et al*, "Theories of International Migration: A Review and Appraisal," *Population and Development Review* 19 (September, 1993), pp. 431-66.

^{viii} An exception is Greenwood & McDowell's (1991) study on the volume of migration flows to the USA and Canada. They created two variables capturing political conditions in the source country: an index of political rights and a dummy indicating the country's involvement in an international crisis related to war or serious clashes with another nation. Greenwood & McDowell found both variables to be statistically significant explanators of migration flows.

^{ix} We should mention two studies that have been useful to us in framing this study. These are Birks, Seccombe and Sinclair's (1986) study on internal migration of oil workers to the Arab Gulf and Adams's (1993) study on the economic and demographic determinants of internal migration from Rural Egypt. Nigem's (1986) study on the socioeconomic and demographic characteristics of Arab Americans is also useful in understanding the composition of Arab migrant flows to the USA. Ours is the first study that examines empirically the determinants of international migration from the Arab region and relates this to recent economic and political events. We should point out that there have been a number of studies done on international emigration from Africa, e.g. Stark (1991), Hatton and Williamson (2001) and Myburgh (2004), but nothing from the Arab region.

^x According to the 2002 *Arab Human Development Report*, with a current annual population growth rate of 2.7% (or 10 million people annually, compared with a global growth rate averaging 1.7%), demographic projections suggest that the region's population will reach 459 million in 2020. These figures present a major challenge to the Arab economy, which must grow at least 6% annually in order to absorb increases in population. Even now, Arab economies cannot keep up with the sizes of their workforces. According to the World Bank's 1998 *World Employment Report*, during the mid 1990s only 37% of employable workers participated in Egypt's labor force and only 29% did so in Jordan's labor force. There is also great diversity between Arab countries with respect to their population sizes. For example, according to the 2002 *Arab Human Development Report*, Egypt has a population of 67 million, Sudan has 31 million and Algeria and Morocco both have about 30 million. In contrast, Bahrain's population is only 640,000 and the populations of Qatar, Kuwait and the United Arab Emirates are 560,000, 1.91 million, and 2.61 million people respectively.

^{xi} The oil-producing states include Algeria, Egypt, Syria, Yemen, Iraq, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates and the non oil-producing states include Jordan, Morocco, Tunisia, Mauritania, Sudan, Comoros, Somalia, Palestine and Djibouti.

^{xii} During the oil boom period of the 1960s and 1970s, the economic growth rate of the Arab region was among the highest in the World; unemployment rates were close to zero and oil-driven prosperity led to a significant improvement in many indicators of economic development. The combination of rapid economic development and a limited supply of indigenous labor in the oil producing countries between 1970 and 1985 resulted in considerable dependence on migrant labor, mainly from non oil-producing countries. In the mid 1990s, migrant labor constituted about 35% of an Arab country's labor force on average, and as much as 80% of the labor force in some oil producing countries such as the United Arab Emirates and Kuwait (World Bank, 1995). The collapse of oil prices in 1986 marked the end of the oil boom era. The decline in the demand for labor in the non oil-producing countries, coupled with a decline in the demand for migrant labor in the oil-producing countries, encouraged international emigration from the Arab region, primarily to Europe and the U.S. However, the spot price of OPEC crude oil rose by over 40% between 1992 and 2003, which may have had negative effects on Arab emigration to other parts of the World.

^{xiii} The countries currently receiving large remittances from migrant workers, both overseas and within the region, include Egypt (\$2.9 billion), Lebanon (\$2.3 billion) and Jordan (\$2 billion). In 2002 the entire Arab region received \$14 billion in remittances, totaling 2.2% of regional Gross Domestic Product (GDP), making the region the highest receiver of remittances in the world (World Bank 2003)

^{xiv} For example, the U.S. price of an Iraqi Dinar fell from an average 4.76 U.S. cents in 1992 to an average of approximately 5/100 of a U.S. cent in 2003.

^{xv} For example, if the U.S. price of an Arab country's currency rises, then Arabs contemplating migration to the U.S. are likely to face lower relocation costs (lower airfares and lower start-up costs following arrival in the U.S., for example). Suppose the U.K. is an attractive alternative destination for Arab migrants. We hypothesize that migration to the U.S. will be encouraged only if the Arab price of the dollar falls *relative* to

the Arab price of the British pound. In contrast, if the U.S. price of an Arab currency falls relative to its U.K. counterpart, the costs of migrating to the U.S. relative to the costs of migrating to the U.K. will rise and this will lower emigration to the U.S.

^{xvi} BCIS is the successor to the Immigration and Naturalization Service, which was part of the U.S. Department of Justice.

^{xvii} See <http://uscis.gov/graphics/shared/aboutus/statistics/index.htm>

^{xviii} See <http://www.unctad.org>.

^{xix} See <ftp.bls.gov/pub/suppl/empisit.ceseeb2.txt>.

^{xx} See <http://www.gpoaccess.gov/eop>.

^{xxi} According to the Migration Information Source (<http://www.migrationinformation.org>), the top two European destinations for Arab migrants are Germany and the U.K. Based on the most recently available data from that source, 226,149 persons born in the Middle East were residing in the U.K. in 2001 (105,981 of those persons were from countries other than Cyprus and Iran). In 2002, 173,334 persons from the Arab region (including 83,299 from Iraq, 47,827 from Lebanon and 28,679 from Syria) were residing in Germany.

^{xxii} See <http://www.statistics.gov.uk/statbase>.

^{xxiii} See <http://laborsta.ilo.org>. CPI data for Iraq were obtained from the Central Bank of Iraq's *Statistical Bulletin* and the *Annual Bulletin* for 2003, 2004 and 2005. These materials are available from the bank's website, located at <http://www.cbiraq.org/cbs7.htm>.

^{xxiv} Foreign-born population stock data for census years 1990 are taken from Gibson and Lennon (1999), which is available online at <http://www.census.gov/population/www/documentation/twps0029/twps0029.html>. The same information for 2000 came from the census website.

^{xxv} The Pound is the official currency in Egypt, Lebanon and Syria, the Riyal is the official currency in Saudi Arabia, the Dinar is the official currency in Iraq, Jordan and Kuwait, the Dirham is the official currency in Morocco and UAE, the Rial is the official currency in Yemen, the Rupee is India's currency, the Baht is Thailand's currency, the Peso is Argentina's currency and the Rand is the South African currency. A number of the countries had fixed exchange rates during some or all of the sample period (Jordan, Saudi Arabia, Syria and UAE) and several of the countries experienced devaluations during the sample period (Argentina and South Africa).

^{xxvi} See <http://www.hmrc.gov.uk/exrate>.

^{xxvii} See <http://www.opec.org/library>

^{xxviii} See <http://www.indo.com/distance/>. This is a Web service that uses data from the U.S. census and a supplementary list of cities around the World to find the latitude and longitude of two places, and then calculates the distances between them.

^{xxix} The *Illegal Immigration Reform and Responsibility Act* set up a telephone clearing house where employers could verify the immigrant status of prospective employees, as well as increasing funds for the Border Patrol. The *Personal Responsibility and Work Opportunity Reconciliation Act* barred non-citizens from some types of public assistance, and eligibility for some other types of assistance was made more difficult.

^{xxx} These are visas issued to aliens who will be employed in high-skill occupations usually requiring high levels of training and education, e.g. professional workers in the high-tech industries. The numerical limitation on H1-B visas was raised from 65,000 to 195,000 in fiscal years 2001-03, thus our dummy equaled one for the 4 years beginning with 2000.

^{xxxi} Note that the exchange rate ratio is a significant determinant of the employment emigration rate; when the exchange rate ratio rises one point from its mean (from 0.63 to 1.63), the demand for employment visas rises by 6,175, a result significant at better than 1%.