

دراسة إحصائية في التحولات الديموغرافية للهجرة
د. نذير عباس إبراهيم الشّمري **د. عصام حسين خضر البياتي**
كلية اقتصاديات الاعمال
جامعة النهرين

المستخلص

تعتبر الهجرة من الظواهر العالمية الحالية المؤثرة في كافة قطاعات المجتمعات وفي كافة دول العالم نتيجة للبحث عن العمل أو من خلال الضغط السياسي والفكري الموجود في تلك الدول، وبذلك حصلت الهجرة بشكل مضطرد خلال العقود الماضية، وأحتلت الدول الصناعية الكبرى ذات الاقتصاد المتطور المرتبة الاولى في استقبال المهاجرين وخصوصا من دول العالم الثالث وأثر ذلك بشكل مباشر على التحولات الديموغرافية للمجتمعات في الولادات والوفيات ومعدلات النمو والشيخوخة.

أن التطور الاقتصادي والتكنولوجي للدول الصناعية الكبرى شجع المهاجرين على القدوم الى تلك الدول بشكل شرعي أو غير ذلك وانعكس بشكل ايجابي على الوضع الاقتصادي والصحي والعلمي للمهاجرين وعوائلهم إضافة الى الاستفادة الاقتصادية لتلك الدول المهاجر منها نتيجة للعوائد التي تحصل عليها من مهاجريها، وهناك دول نامية كثيرة يعتمد اقتصادها بشكل أساسي على عوائد المهاجرين.

هذا البحث هو عرض للنموذج المقدم من قبل (Jacob, Siegel & Swanson, 2004) والخاص بأستخراج صافي الهجرة (net migration) من النموذج أعلاه بالاعتماد على الاحصاءات السكانية للولايات المتحدة الامريكية للفترتين 2000 & 2010 على اعتبار أنها من الدول الرئيسية في استقبال المهاجرين من الدول الاخرى، وتم تحليل البيانات للفترة المذكورة ومقارنتها بنتائج تحليل الباحثين أعلاه.

Statistical Study on Demographic Transitions of Human Migration
Dr. Nathier Abas Ibrahim Dr. Esam Hussien Khder
Business Economics Collage
Al-Nahrain University

Introduction

Human migration is a global phenomenon affects all parts of the world, often in profound ways. This has certainly been true from a historical perspective, but it is no less true today.

Indeed, over more than sixty years passed, the movement of people across borders has been growing in volume, scope, and intensity; in addition, there is little evidence to indicate that this trend will abate anytime soon. Most countries go through several fundamental transitions as they develop. The industrial transition is the movement of the majority of the labor force and economic output from agricultural to industrial

jobs, and then to service jobs. The demographic transition involves declines in fertility and mortality, slowing population growth rates, populations aging, and often a changed role for women, such as reduced childbearing and greater participation in the formal labor market. The migration transition refers to the movement of a country from being a net labor exporter to being a net labor importer. The demand for labor increases, and the supply grows more slowly, a consequence of the demographic transition. A key turning point occurs when labor shortages appear in key sectors of the economy, and countries begin to import, as well as export, labor. The migration transition, then, can be seen as the result of a long series of interconnected changes within an economy and society. It can also be considered a natural and largely predictable product of economic transformation.

International migration is a phenomenon that is shaped by population dynamics, regional developments, social, economic and political push and pull factors and other factors such as history and culture, there is also evidence to suggest that migration itself can have important impacts on economic development, especially on relatively poorer countries experiencing significant outflows of migrants. Development aid is commonly advocated as one of the most effective instruments to reduce international migration. Nevertheless, empirical evidence shows that push factors do not automatically result in massive migrations and that aid policies systematically fail to meet their stated objectives.

Constitute a unique policy experiment, in which migration flows reflected underlying economic forces, rather than government policy. International migration can have big effects on internal income distribution, both in the source country and in the country of oaring.

This paper shows the models given in [Jacob, Siegel & Swanson,2004] for getting the net migration, furthermore calculating the net migration for male, female and total population of USA for two census (2000 & 2010), as the largest country in the world for migration, and make compression with the same results obtained by [6],for previous censuses.

Migration Models

With the importance of economic conditions and the increase of communication and transportation systems, people increased their desire to change residence. A mere change of residence however does not always constitute a migratory movement. A migratory move implies an intention that the move be permanent, hence a migrant permanent, and the move effects on the population growth of the areas of origin and

destination, migration is therefore, the third component of population growth on an area, together with fertility and mortality. From the administrative, migration may be classified into two categories internal and international. Internal migration is the movement within the boundaries of a signal country, while international migration is the movement from one country to another.

Vital statistics is one of the indirect procedures to calculate the net migration, which required international components method for real data on births and deaths happened through two censuses, which based on calculating net migration by substituting the natural increasing in the population change $(B - D)$.

The balance of immigration and emigration of foreign born persons during previous century denoted by the number of death of immigrants in the country prior to the census date, net migration is estimated as the difference between population change and natural increase over particular time interval, when the start and end populations are known, population changes is easily obtained, thus: see [6 & 9]

$$P_F = (I_F - E_F) - D_F \quad (1)$$

$$(I_F - E_F) = P_F + D_F \quad (2)$$

Where P_F is the foreign born population, I_F is the immigrants born abroad, E_F is the emigrant born abroad, and D_F is the deaths of foreign born persons in the country, in equation (2), $(I_F - E_F)$ does not mean the net migration because of the movement of native persons and return migrants, we can write the net migration as: see [6]

$$(I - E) = (P_1 - P_0) - (B - D) \quad (3)$$

Which derived as a residual, $(B - D)$ is the natural increase in population during the period $(P_1 - P_0)$.

The best method to estimate the net migration is Cohort – component on the basis of separate allowances for the components of population change, then: see [6]

$$(I_a - E_a) = P_a^l - sP_{a-t}^0 \quad (4)$$

Where I_a & E_a represents immigration and emigration in a cohort defined by age (a) at the end of the period P_a^l at this age in the second census, P_{a-t}^0 , the population (t) years younger at the first census and (s) , the survival rate for this age cohort for an intercensal period of (t) years, that is (s) is a simplified representation of nS_{a-t}^t for the cohort aged $(a \text{ to } a + n)$ years at the end of period (t) , and the formula for the new born cohort is: see[6]

$$(I_a - E_a) = P_a^l - sB \quad (5)$$

Where B is the births that occurred in the intercensal period.

The formula of ten year survival rates for (5) year age group is: see [6]

$${}_5S_x^{10} = \frac{{}_5L_{x+10}}{{}_5L_x} \quad (6)$$

Which means the probability of survival from age x to $x + 5$ for a ten years period. The forward survival method of indirectly estimating net migration uses survival ratios to calculate the population of each age that survived from the beginning of the time period of interest to the end point. The equations which estimates the forward survive is: see [6 &9]

$$\text{Forward estimate : } M_1 = (I_a - E_a)_1 = P_a^l - sP_{a-t}^0 \quad (7)$$

Where,

l : the interval in years between the two dates

P_a^l : the end population aged a

P_{a-t}^0 : the initial population aged a

S : the survival rate for aged a

The second method is the reverse survival which used the same concepts as forward survival but instead projects the population of an age group from the end of interval backwards in time to the beginning of the interval. This method estimates migration at the start of the period before any mortality has occurred. It is therefore a more complete estimate of the volume of net migration than forward survival because migrants who died are included. See [6 & 9]

$$\text{Reverse estimate : } M_2 = (I_a - E_a)_2 = \frac{P_a^l}{s} - P_{a-t}^0 \quad (8)$$

The third method used to overcome some of the bias in the forward and reverse survival methods is to use the average survival method. The method adjusts for the mortality of migrants by averaging the net migration estimates produced from forward and reverse survival methods. See [6 & 9].

$$\text{Average estimate: } M_3 = \frac{M_1 + M_2}{2} \quad (9)$$

The equation that used to derive the estimates and involves an adjustment of either the forward or the reverse estimates by the square root of the survival rate, representing survival for approximately one half the period. See [6]

$$M_F = (I_a - E_a)_F = \frac{P_a^l - sP_{a-t}^0}{\sqrt{s}} \quad (10)$$

$$M_R = (I_a - E_a)_R = [(P_a^l \div s) - P_{a-t}^0] * \sqrt{s} \quad (11)$$

$$M_F = M_R = I_a - E_a \quad (12)$$

Table (1 , 2 & 3) shows the net immigration (male , female & total) for USA population by two census data (2000 & 2010), and the applicable of the above equations:

Table (1): Calculation of estimates of net migration of males for age cohorts, by the life table survival method, for the USA 2000 - 2010.

age	Census 2000 (000)	Census 2010 (000)	10 year life table survival rate ¹	Forward estimate ² 2- (1*3)	Reverse method ³ (2\3)-1	Average method ⁴ (4+5)\2	Square root of survival rate $\sqrt{3} =$	Net immigration ⁵ 5*7 or 4\7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0-5	9811	10779	0.9923	1043.5	1051.6	1047.6	0.9961	1047.5
5 -	10523	10654	0.9988	143.6	143.8	143.7	0.9994	143.6
10 -	10520	10421	0.9993	-91.6	-91.7	-91.6	0.9996	-91.7
15 -	10391	11159	0.9974	795	797.1	796.4	0.9987	786.1
20 -	9688	11100	0.9939	1471.1	1480.1	1475.6	0.9969	1475.1
25 -	9799	10873	0.9926	1146.5	1155.1	1150.1	0.9963	1150.8
30 -	10322	10308	0.9928	60.3	60.8	60.6	0.9964	60.6
35 -	11319	10191	0.9918	-1035.2	-1043.7	-1039.5	0.9959	-1039.4
40 -	11130	10509	0.9885	-493	-498.7	495.9	0.9942	-495.8
45 -	9890	11165	0.9824	1449.1	1475	1462.1	0.9912	1461.9
50 -	8608	10827	0.9732	2449.7	2517.2	2483.5	0.9865	2483.2
55 -	6509	9470	0.9614	3212.2	3341.2	3276.7	0.9805	3276.1
60 -	5137	8024	0.9449	3170	3354.9	3262.5	0.9721	3261.2
65 -	3699	5747	0.9189	2347.9	2555.2	2451.6	0.9586	2449.4
70 -	2663	4191	0.8805	1846.2	2096.8	1971.4	0.9383	1967.5
75 -	1917	3195	0.8137	1635.1	2009.5	1822.3	0.9021	1812.7
80 -	1380	2302	0.7136	1317.2	1845.9	1581.6	0.8447	1559.3
85+	1134	1893	0.8964	876.5	977.8	927.2	0.9468	925.8

USA Census data for 2000 & 2010.

¹calculated from USA official life tables for 2006.

²formula 7

³formula 8

⁴formula 9

⁵formula 10 or 11

Table (2): Calculation of estimates of net migration of foreign born females, by the life table survival method, for the USA 2000 - 2010.

age	Census 2000 (000)	Census 2010 (000)	10 year life table survival rate ¹	Forward estimate ² 2- (1*3)	Reverse method ³ (2\3)-1	Average method ⁴ (4+5)\2	Square root of survival rate $\sqrt{3} =$	Net immigration ⁵ 5*7 or 4\7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0-5	9365	10320	0.9946	1015.03	1021.6	1018.3	0.9968	1018.3
5 -	10026	10232	0.9989	216.2	216.4	216.3	0.9995	216.3
10 -	10008	9975	0.9995	-27.5	-27.5	-27.5	0.9997	-27.2
15 -	9829	10611	0.9988	794.1	795.1	794.6	0.9994	794.6
20 -	9276	10680	0.9978	1424.3	1427.4	1425.9	0.9989	1425.8
25 -	9583	10545	0.9974	987.2	989.8	988.5	0.9987	988.5
30 -	10189	10092	0.9969	-64.4	-65.1	-65	0.9984	-65
35 -	11388	10076	0.9956	-1262	-1267.6	-1264.5	0.9978	-1264.8

40 -	11313	10500	0.9931	-735.3	-740.4	-737.9	0.9966	-737.9
45 -	10203	11430	0.9893	1336.6	1351.1	1343.9	0.9946	1343.8
50 -	8978	11282	0.9843	2445.5	2484.5	2465	0.9921	2464.9
55 -	6961	10067	0.9772	3264.5	3340.6	3302.6	0.9885	3314.2
60 -	5669	8733	0.9659	3257.4	3372.4	3314.9	0.9828	3314.4
65 -	5133	6514	0.9474	1651.3	1742.9	1697.1	0.9733	1696.4
70 -	4954	5011	0.9202	452.5	491.8	472.2	0.9592	471.8
75 -	4371	4123	0.8694	322.9	371.4	347.2	0.9324	346.3
80 -	3110	3431	0.7866	984.7	1251.9	1183.3	0.8869	1110.3
85+	3012	3859	0.7394	1632.2	2207.2	1919.7	0.8599	1650.7

USA Census data for 2000 & 2010.

¹calculated from USA official life tables for 2006.

²formula 7

³formula 8

⁴formula 9

⁵formula 10 or 11

Table (3): Calculation of estimates of net migration of total population for age cohorts, by the life table survival method, for the USA 2000 - 2010.

age	Census 2000 (000)	Census 2010 (000)	10 year life table survival rate ¹	Forward estimate ² 2- (1*3)	Reverse method ³ (2\3)-1	Average method ⁴ (4+5)\2	Square root of survival rate $\sqrt{3} =$	Net immigration ⁵ 5*7 or 4\7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0-5	19176	21099	0.9929	2059.2	2073.9	2066.6	0.9964	2066.5
5 -	20549	20886	0.9989	359.6	360	359.8	0.9994	359.8
10 -	20528	20396	0.9994	-119.7	-119.8	-119.7	0.9997	-119.8
15 -	20220	21770	0.9981	1588.4	1591.4	1589.9	0.9990	1589.9
20 -	18964	21780	0.9958	2895.6	2907.9	2901.8	0.9979	2901.8
25 -	19382	21418	0.9949	2134.8	2145.8	2131.9	0.9975	2140.3
30 -	20511	20400	0.9948	-4.3	-4.4	-4.3	0.9974	-4.4
35 -	22707	20267	0.9937	-2296.9	-2312	-2304.5	0.9968	-2304.7
40 -	22443	20691	0.9908	-1707.1	-1559.9	-1633.4	0.9954	-1552.7
45 -	20093	22595	0.9958	2407.1	2597.3	2502.2	0.9979	2591.8
50 -	17586	22109	0.9788	4895.8	5001.9	4948.6	0.9893	4948.6
55 -	13470	19537	0.9695	6477.8	6681.6	6579.7	0.9846	6578.9
60 -	10806	16757	0.9555	6431.2	6731.4	6581.3	0.9775	6579.9
65 -	8832	12261	0.9338	4013.7	4298.2	4155.9	0.9663	4153.5
70 -	7617	9202	0.9021	2331	2583.6	2457.3	0.9498	2453.9
75 -	6288	7318	0.8451	2004	2371.3	2187.7	0.9193	2179.9
80 -	4490	6161	0.7569	2766	3658.4	3212.2	0.8697	3181.5
85+	4147	5752	0.6768	2945.4	4352.8	3648.9	0.8227	3580.9

USA Census data for 2000 & 2010.

¹calculated from USA official life tables for 2006.

²formula 7

³formula 8

⁴formula 9

⁵formula 10 or 11

From table (1, 2 & 3), we can conclude that for USA population (male, female & total), the net immigration was negative in the ages {(10-15), (30 – 45)}, for the three tables because that the population in these age groups in 2011 were less than that of 2000, that means the growth rate in these age groups is in a decreasing pattern from census to another, while the highest were in the age group (55 – 65), and the lowest were in the age group (5 – 10). While in [Jacob, S. Siegel & David, A. Swanson, 2004], we didn't find negative net immigration because the population in 1990 is more than 1980 for the all groups, and the highest where in the age group (5-10), the lowest in (65-70), in males population, while the highest in females where in (15-20), and the lowest where in (70-75), which were negative by the same cause.

Migration Data Analysis

Estimates of net migration between the major development groups show that since (1960) the more developed regions have been net gainers of emigrants from the less developed regions. Furthermore, net migration to the more developed regions has been increasing steadily from (1960) to (2000). During (1990-2000), the more developed regions were gaining annually (2.5) million migrants. About half of that net flow was directed to Northern America (1.3 million annually). During (2000-2010), the level of net migration to the more developed regions as a whole changes only slightly, but there is some increase in the net number of migrants received by Northern America (1.5 million annually), net migration to the more developed regions remain at about (2.3) million per year, of which (1.3) million are directed to Northern America. With respect to the other major areas, Asia was by far the major source of migrants during (2000-2010) (1.3 million annually), followed by Latin America and the Caribbean (1.1 million annually) and then Africa (0.4 million annually), more than half of all the net number of emigrants from the less developed regions is from Asia, between (25) per cent to (30) per cent from Latin America and the Caribbean, and the remaining from Africa. At the country level, during (2000-2010), (33) of the (45) developed countries has been net receivers of international migrants. This group includes traditional countries of immigration such as Australia, Canada, New Zealand and the United States, most of the populous countries in Northern, Southern and Western Europe as well as the Russian Federation and Japan. The movement of people from less developed regions to more developed regions has dominated the world migration patterns for almost half a century, but flows among developing countries have also been important. Several developing countries or areas have

been attracting migrants in large numbers, including Hong Kong SAR China, Kuwait, Malaysia, Qatar, Saudi Arabia, Singapore, South Africa, Thailand and the United Arab Emirates. Jordan and the Syrian Arab Republic have been the primary receivers of refugees from Iraq. Many African countries have been the destination of refugee flows from neighboring countries. During (2000-2010), the countries having the highest levels of net emigration included China, India, Indonesia, Mexico and the Philippines. International migration is the component of population change most difficult to measure and estimate reliably. Thus, the quality and quantity of the data used in the estimation and projection of net migration varies considerably by country. Furthermore, the movement of people across international boundaries, which is very often a response to changing socio-economic, political and environmental forces, is subject to a great deal of volatility. Refugee movements, for instance, may involve large numbers of people moving across boundaries in a short time.

Table (4): Global Migration Challenges;

Regions	Total (000) 2010	Percentage of total population 2010	Percentage female migrants 2010	Net migration among the foreign born (000) 2005-2010	Refugees (000)	Average annual rate of change (percentage) 2005-2010
World	213944	3.1	49	24359.8	15150.4	1.8
More Developed	127711	10.3	51.5	14715.3	2081	1.7
Less Developed	86232	1.5	45.3	9644.5	13069	2.0
Least Developed	11531	1.3	47.4	1089.9	1880.8	1.1
Africa	19263	1.9	46.8	2326.8	2133.4	1.7
Asia	61324	1.5	44.6	6768.6	10378.2	2.1
Europe	69819	9.5	52.3	8097.5	1602.2	1.6
Latin America	7480	1.3	50.1	769.1	350.3	1.7
North America	50042	14.2	50.1	5760.4	453.2	1.9
Oceania	6015	16.8	51.2	637.3	33.6	1.7

Source:U N "The World Population Prospects" 2010.

Conclusion

International migration is a positive force for development, both in countries of destination and in countries of origin. Development and migration are closely linked. Studies have stressed that both receiving and sending areas benefit economically, socially and culturally from

migration. Migrants themselves and their families also benefit. The developmental impact of migration is, nonetheless, dependent on effective migration governance. Although both internal and international migration contributes to development, there is little quantitative research available which highlights the correlation between internal migration and development. Most of the studies are based on the experience of international migration. The pace and scope of migration is increasing everywhere in the world, and is being fuelled by forces that are not likely to change in the near future. Serious and growing economic disparities, political instability, persecution and demographic pressures will continue to push and pull people to move within and between countries. Contemporary migration is being fuelled by a complex mix of social, economic, demographic and political forces. The growing perceived, if not real, distance between the quality of life and opportunities available to people in rural versus urban centers is pushing millions of people in developing countries to move to towns and cities that are overpopulated, under-financed and under-served. Meanwhile, the increasingly wide gap between developed and developing markets of the first and third worlds, and the relative stagnation of markets in the latter continues to provoke a demand for cheap labour by rich countries and a need by people in poor countries to move in search of a better quality of life. Political instability and conflict also remains an important push factor that in the last twenty years has caused the forced migration of millions of people within and across borders. The compression shows that; there is decreasing growth in all age groups for both sexes which affected on the total, and also affected on the net migration of the age groups (10-15 & 35-45). The net migration in (2000-2010), was higher than that of (1980-1990), even with the decreasing growth rate.

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