ABSTRACT

This paper advances that international migration from developing to more developed countries during the last decades may have resulted in a smaller global world population than the one which would have been attained had no international migration taken place. Because most recent migration has been from high to low birth rates countries, and migrants send back to their home countries models and ideas that prevail in host countries, international migration would have contributed to the demographic transition in the former. In particular, emigration would have fostered education, i.e. the single most important determinant of the demographic transition, among non-migrant populations in migrants' regions of origin. This framework is tested with data from three major countries of origin of migrants: Egypt, Turkey and Morocco.

Migration is commonly regarded by development economists as a potentially win-win process, one susceptible to create net wealth in both regions of origin and destination of migrants. How can the question of whether international migration is a « positive sum game » be transposed to demography? This paper advances

1. The demographic ideal of a closed population

Migration was never built up by demographers at the same level of formal elaboration as the two other components of population change, i.e. birth rates and death rates which form together the 'natural' growth of any population. Migration is absent from the core model of formal demography—known as the 'theory of stable populations'—and methods for estimating migration are much less settled than those devised for measuring fertility and mortality.

Formal demography is anchored in the tradition of biology. It models population reproduction as the result of two biological processes, natality and mortality. The modern mathematical demography founded by Alfred Lotka simply excludes external migration[3]: « By a very natural abstraction, demographic analysis envisages as a point of departure the case of a closed population, that is to say, a population whose numbers receive new accessions only through births and suffers losses only through deaths, immigration and emigration being excluded » (Lotka 1998 [1939], p. 53). Basic analytical models—to begin with the most commonly used of them, i.e. the life table which describes the extinction of a generation « in the absence of external migration »— are constructed on the assumption of a « closed » population, i.e. a population that receives or sends no external migration[4].

True populations however are not closed. States, or nations, define populations and borders separate national populations from one another. As soon as a population is delineated by a border, border crossing becomes one of the factors of its growth and reproduction. For Lotka this is not a reason for introducing migration in the fundamental demographic equations: « Demographic statistics is concerned primarily with human populations, and particularly with certain more or less isolated populations, as for example those of a nation […] The practical problems [posed by migration across borders] are reduced more and more as the area included in the study expands, since emigration and immigration are plainly functions of the border periphery, whereas births and deaths are instead functions of the land area, and the ratio between the periphery and the internal area continuously decreases as the latter increases. Circumstances of politics and commerce further tend to accentuate that effect, so that for an entire country migration can in certain cases be almost negligible as a factor determining the growth of its population […] » (*Ibid.*)[5].

States are not only frames of reference for the delimitation of any national population, they also form the actual frame of population data collection. Statistical records thus incorporate migration, implicitly in vital statistics[6] or explicitly in migration statistics. As a result, migration is a matter of interest for demographers, which they take into account as soon as they leave models for tackling real statistics. Their interest in migration

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[3] In this section we use the term 'external' rather than 'international' migration. The latter refers to nations, a modern division of the world which bears no meaning for most of history, while the former refers inclusively to any sort of territory.

[4] Later on, Keyfitz (1968) introduced the notion of "interacting populations", and the tool of "immigration vector" in the mathematics of population.

[5] Interestingly, theories of international migration do not put a greater emphasis on demography than the one demographic theory puts on international migration. Economic theories recognise that international differentials are key factors of migration, but they rarely consider demographic differentials (in population density or population growth) as true factors. Only few of them would endorse a statement such as « modern migration stems mainly from the difference in population growth between the developed and the less developed countries » (Davis 1988 p. 256). In fact, there are too many exceptions to make a rule of it. To take a Middle Eastern example, Lebanon is a country of emigration to Saudi Arabia, despite the fact that Lebanon has a much lower rate of natural population growth than Saudi Arabia (below 1% compared with 3.3% in 1995-2000), and Lebanon is a place of immigration for Syrians, despite the fact that Lebanon has a much higher demographic density than Syria.

[6] For example, international migration affects death records and consequently the statistical observation of mortality: the death of an emigrant escapes national statistics of countries of origin so that emigration produces the same result as death in reducing the size of a generation.

can follow two very distinct purposes: either eliminating migration from vital records for its interference with biological demography, or measuring migration for its contribution to overall demography.

Eliminating the interference of external migration with the statistical observation of births and deaths has been an important concern for demographers. Following chemistry[7], formal demography aims at studying fertility and mortality « in the pure state », and for this purpose needs to remove the blurring effect of external migration (Henry 1972). What would have been recorded numbers of births and deaths if no migration had taken place? is the question to be solved. Because migration is a selective process and because it changes the course of life, its statistical interference with fertility and mortality is a complex one. Had those who have emigrated the same probability of giving birth or of dying than those who have not emigrated? To which extent do birth rates and death rates obtained on incomplete statistics (they do not cover emigrants) apply to all
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Figure 1: A framework of the impact of international migration on birth rates
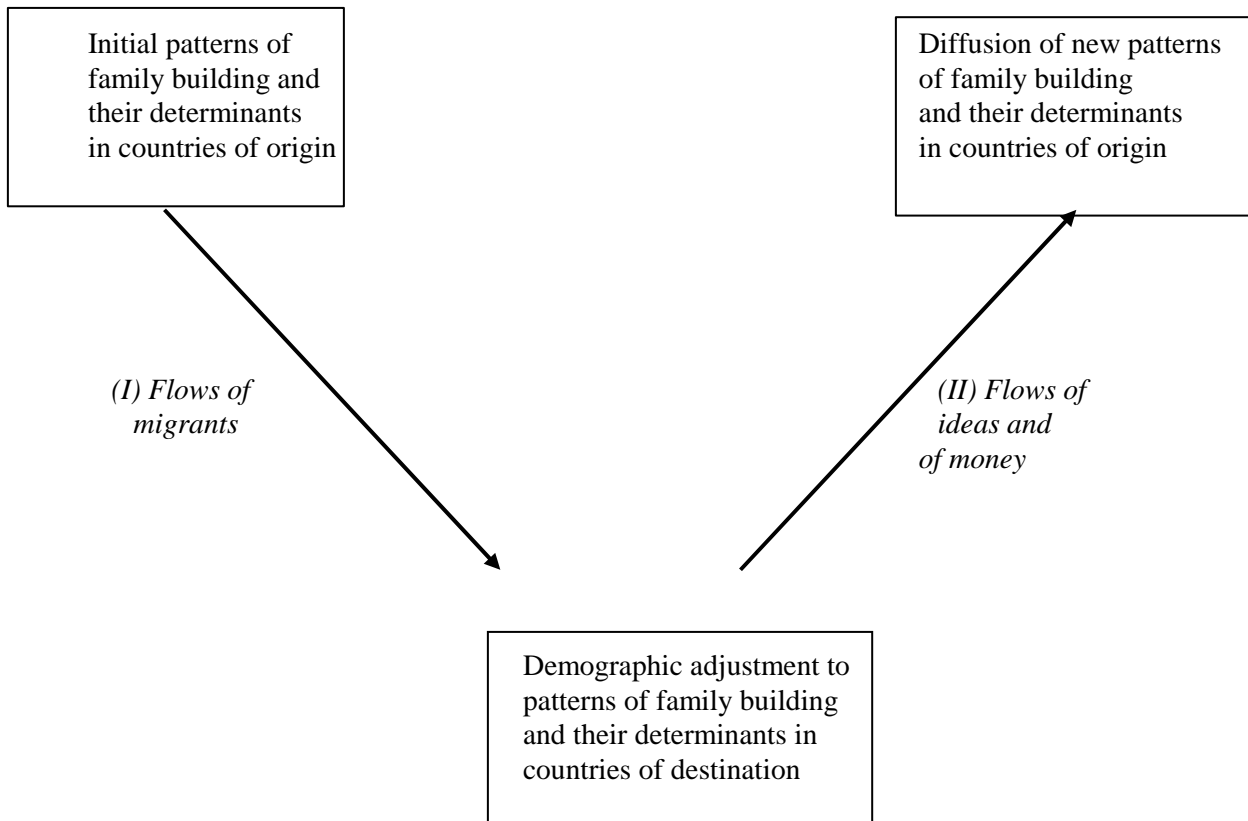
3. *Downstream demographic adjustment of migrants*

When people move, they change their environment but not their selves. In a short lapse of time, they will be subjected to the living conditions prevailing in their new environment, which are important to determine the cost of children. For material reasons, migration will most probably affect the timing of childbearing and the desired number of children. It will take longer however for immigrants to change some of their individual characteristics, such as the level of education which is recognised an important determinant of fertility, and even longer to adapt to a new culture. This will happen either later in the course of their own lives or only to their children. A quick but limited effect of migration on fertility has thus to be expected, before any deeper shift takes place.

Table 1: Total fertility rates* (children per woman) of foreign citizen women residing in France, compared with their country of origin and with French women, around 1980, 1990 and 2000

Citizenship	Residence	1980	1990	2000
Algerian	France	4.22	3.22	3.19
	Algeria	6.77	4.67	2.97
Moroccan	France	5.14	3.51	3.32
	Morocco	5.65	4.03	2.87
Tunisian	France	5.21	3.93	3.29
	Tunisia	5.30	3.62	2.16
Turkish	France	5.13	3.73	3.35
	Turkey	4.40	3.40	2.57
French	France	1.87	1.76	1.82

* the total fertility rate (TFR) is the final average number of children born per woman, obtained as the sum of age specific fertility rates from 15 to 49 years, during a given period of time.

Sources: France (in 1982, 1990, 1999): Legros 2003 ; Algeria, Morocco, Tunisia, Turkey: United Nations 2003.

In fact, the convergence of immigrants' fertility with natives' seems to be a slow process: for example in France—the country which hosts the largest Arab expatriate community outside the Arab world—total fertility rates among immigrants women of MENA origin have decreased during the 1980s and the 1990s, thus reducing the distance with their host population, but surprisingly at a much slower pace than in their countries of origin (Table 1). Algerian women living in France have experienced an earlier fertility decline than those left behind in Algeria (6.77 children per women against 4.22 in 1980), but since this decline has been slower among the former than the latter, Algerian emigrants have now higher fertility rates than their non-migrant fellow citizens in Algeria (3.19 against 2.97 in 2000). The same holds for Moroccan, Tunisian and Turkish women. This unexpected result is largely due to a statistical artefact resulting from two characteristics of migration: for women migration is often caused by marriage (another result of which being fertility), and it is a selective phenomenon.

To fully understand this artefact it has to be borne in mind that, after the quasi-closure of Europe to labour immigration starting from the mid 1970s, family reunification has become the first channel of legal entry for non-European aliens. Firstly, family reunification applies to wives or husbands, which means that a birth is very likely to follow shortly after migration[15]. On average, 49% of Algerian immigrant women are married at the time of immigration in France, 52% of Moroccans and Tunisians and 59% of Turks (Borrel & Tavan 2003). That births delayed in countries of origin are recovered in countries of emigration clearly emerges from the fact that, for a same generation of women, those who reside in France for more than ten years have a much lower level of fertility than those arrived from less than ten years (Table 2)[16]. The demographic adjustment effectively operates, but only after a certain duration of stay. Secondly, family reunification tends to perpetuate the social selection of migrants, and those arrived in France at the time of massive labour migration (before 1974) where mostly unskilled workers, belonging to social groups with higher fertility than the national average in their home countries.

All began in the wake of the 1973 Arab-Israeli war. Beforehand, all Arab countries except one, Lebanon, were still in a pre-transitional stage regarding fertility, with total fertility rates ranging from 6 to more than 8 children per woman according to country, and it was only in the second half of the 1970s that social and economic transformations began to translate into rising age at marriage among women (Rashad & Osman 2003) and birth control. However, in major Arab oil producing countries (the Gulf states, Libya and Algeria), the sudden change in scale of state revenues in the immediate aftermath of the 1973 war which sent crude oil prices soaring, jammed the transition of fertility. Oil revenues enabled governments to establish welfare state systems through financing development (health, education, etc.) on one hand, and subsidising consumption on the other hand.

While development activities were conducive to fertility decline, subsidised consumption, by reducing the cost of children, could work to the opposite effect. This is what happened in a number of Arab countries, especially the most oil-rich ones, whose governments, by keeping the population in check through generous oil wealth redistribution, were able to play the forces of social conservatism and change off against one another. Social conservatism was reflected in particular by a continuing very low labour force participation rate among married women[19]. So, by both cutting the costs of fertility and keeping women in the home, oil revenues indirectly promoted high fertility. To some extent, oil revenues "generated" population[20]. As if by contagion, the oil-type of early marriage and high birth rates persisted in non-oil countries of the Mashreq (except

Subsequent studies of marriage in Egypt revealed that rising material expectations and increased consumerism among the youth had affected the cost and the timing of marriage, and they attributed this transformation to changes in aspirations—notably regarding the acquisition of consumer durables—repatriated in Egypt from Saudi Arabia and other Gulf countries by waves of men labour migrants, as well as to actual increases in income and standards of living generated by emigrant workers remittances. Singerman and Ibrahim (2003) found that, with a dramatic increase in the 1970s and the 1980s then a stabilisation in the 1990s, the cost of marriage in Egypt has been responding to the growing then stabilising size of the Egyptian labour migration to the Gulf. Other scholars have interpreted decreasing rates of economic activity among woman at 20-24 years between 1988 (24%) and 1998 (21%)—"contrary to the expectations for a period of structural adjustment"—as a sign that "modern marriage in Egypt may offer young girls something of greater value than the alternative of earning their own income through wage work" (Amin & Al-Bassusi 2003: 3). Whatever strong they are, material motives are not the only force at play. Also ideas matter. With this respect, it is probable that social and cultural conservatism encountered in Saudi Arabia by Egyptian migrants and brought back home to a more open Egyptian society, are part of the explanation (Singerman & Ibrahim 2003).

Why did Egyptians or Jordanians, but not Moroccans or Tunisians (or Turks, outside the Arab world),

hypothesised to have brought about normative changes, whether towards reinforced control of the family over its members or towards increased individual autonomy.

5. *Upstream diffusion of demographic models by migrants*

What would have been the level of fertility had no international migration taken place? Comparisons over

opposite directions, the first ascending and the second descending, but the irregularity of remittances contrasts with the perfect regularity of birth rates, as if remittances themselves had no direct impact on birth rates. It is rather the size of the Moroccan expatriate community and the intensity of non-material links its members develop with Morocco which matter here: the continuous circulation of ideas is not subjected to the same ups and downs as money transfers. To sum up, time series suggest that Egyptian migration to the Gulf did not bring home innovative attitudes regarding marriage and birth, but rather material resources—in quantity varying with years—for the achievement of traditional family goals. On the contrary in Morocco, emigration to Europe has coincided with a fundamental change of attitudes, without variations in material resources drawn from emigration affecting the trend.
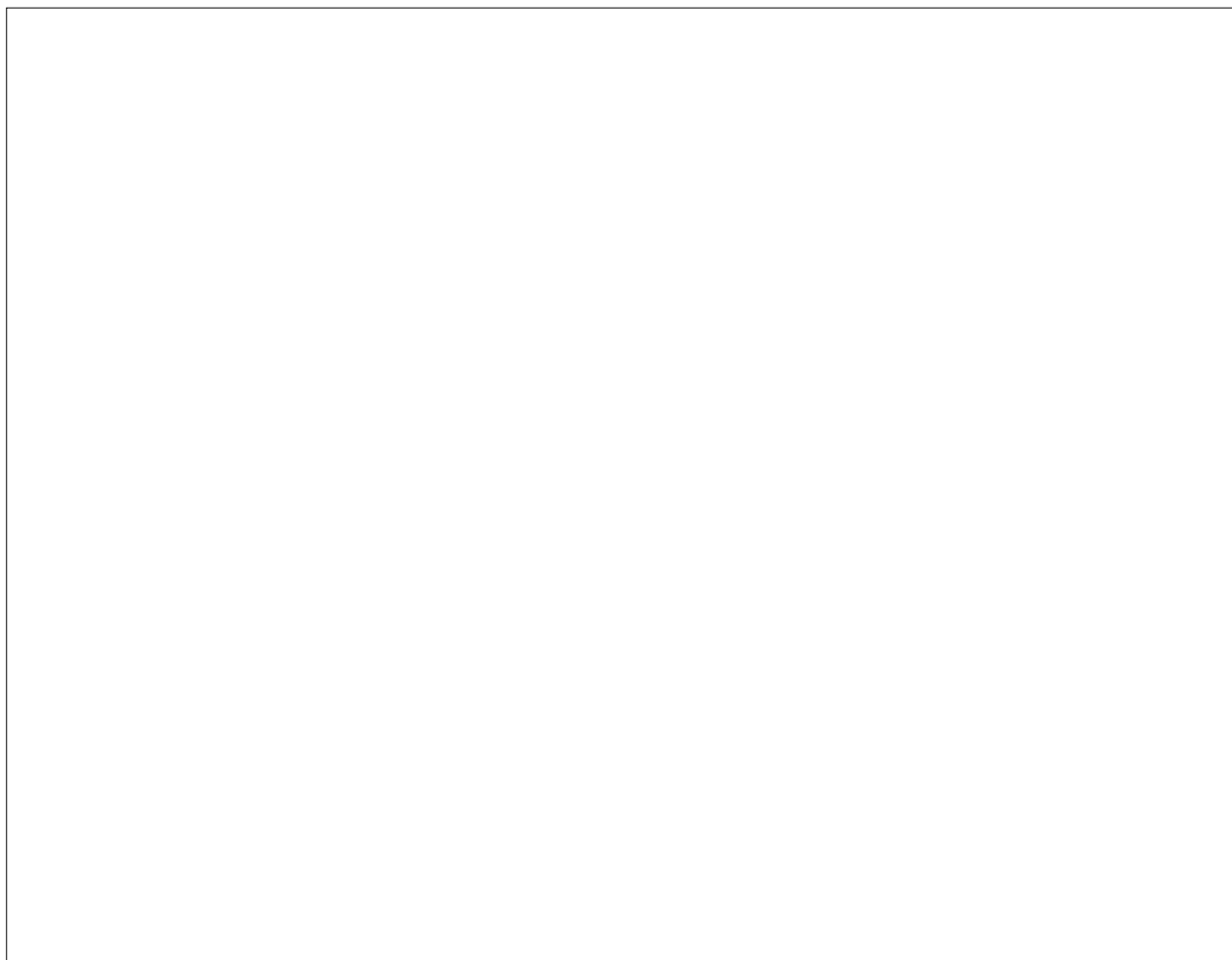
Time correlation is not causation, however. For asserting that migration truly contributes to determining the pace and direction of changes in birth rates, rather than simply covariates with these changes – which would happen if migration on one side, and the decline of fertility on the other side, were two independent outcomes of a same third evolution, such as an increasing openness of societies to the outside world – one has to verify that changes in birth rates vary with the degree of exposure to migration, i.e. that regions from where intense emigration has departed display more dramatic demographic changes than those with little or no emigration: the closer the agents of diffusion, the stronger their impact. Space correlations are expected to corroborate time correlations.
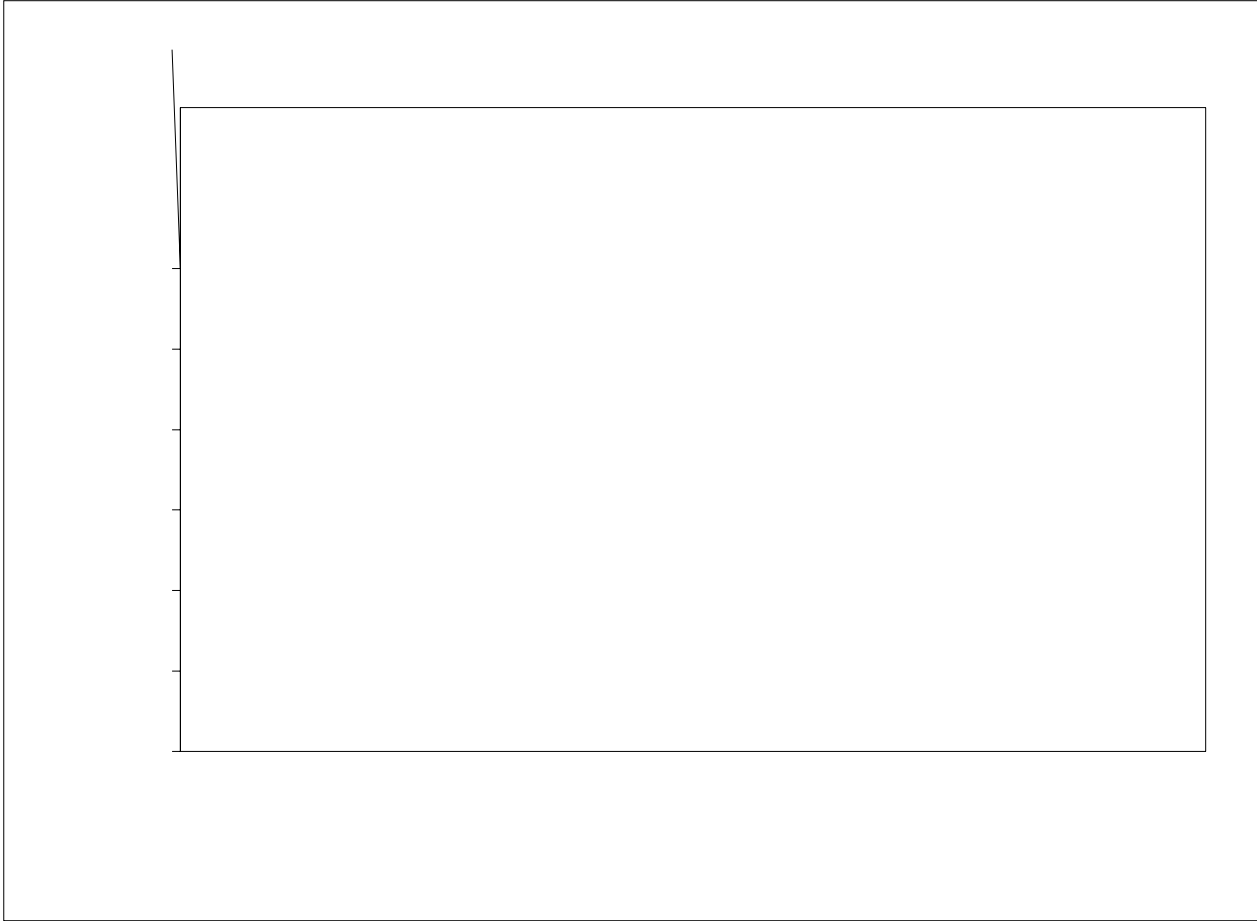
In both countries, emigration and the pace of fertility transition are effectively found to covariate in space (even though space correlations are lower than time correlations, and interestingly in opposite directions as it was the case for time correlations. In Egypt (Figure 5), the higher the rate of emigration the slower the process of fertility decline, a correlation which suggests that migration has curbed forces of change, possibly in relation with a stronger exposure to conservative ideas prevailing in countries of emigration, i.e. the Gulf and Saudi Arabia. On the contrary in Morocco (Figure 6) faster demographic change is associated with higher rates of emigration, as if the contact with European culture and way of life established through emigrants had accelerated demographic change.

A key intermediate variable between emigration and demographic change of populations left behind seems to be education. On one side there is overwhelming evidence that education is the single most important determinant of the transition of fertility in developing countries (Cleland & Hobcraft 1985, Jejeebhoy 1995), and MENA individual countries are not exceptions to this worldwide rule, even though this is not a one-to-one relation. In Egypt as well as in Morocco, declines in fertility have been associated with rising education, in particular among women.

On the other side, MENA data support the hypothesis that migration has had an impact on the average education of non-migrant populations left behind, and that this impact varies according to the region which major streams of emigrants are destined to: emigration to the Gulf would have sl

Table 3: Correlation Coefficients between Emigration, Education and Fertility in Egypt,
Morocco and Turkey

Variables	Egypt	Morocco	Turkey(1)
Emigration x Fertility	+ 0.66	- 0.29	- 0.42
Education x Fertility	- 0.85	- 0.45	- 0.84
Emigration x Education	- 0.50	+0.26 (U) / + 0.40 (R)	+ 0.32

(1) Correlation computed on provinces with a HDI below 750

The important point is that emigration to the West could have fostered education in regions of origin of migrants, thus indirectly contributing to the demographic transition of non-migrant populations. Ideas and values would have impacted on a key structural determinant of fertility. The inducement effect of migration on the formation of human capital in migrants' countries of origin does not refer to the "brain gain" hypothesis, according to which the success encountered abroad by highly skilled emigrants would encourage their non-migrant fellow citizens to invest in education, thus resulting in more human capital than if no brain drain had taken place (Stark, 2000). It rather emphasises the impact of migration on the average level of mass education. Evidence accumulated in various contexts shows that remittances being channelled by families, they reach the very places from where migrants come and are used for basic needs including education and health care, i.e. for human capital investment (Newland, Kathleen and Erin Patrick 2004). In addition to this general argument, we argue that, if emigrants are living abroad in a context where education is more widely spread than in the region where they come from, then they convey pro-education values to their community of origin.

B. CONCLUSION: THE GLOBAL DEMOGRAPHIC BENEFIT OF MIGRATION

When people move from one country to another, they change their cultural, social and economic environment, as well as their individual position in the environment where they actually live. Such a change impacts on the way they behave, including in matters related with demographic reproduction. It can be a direct impact on marriage and fertility, or an indirect one, through education. Because migrants are conveyors of values and ideas to the world left behind, non-migrants in countries of origin can themselves react to changes

the Gulf, the exception. The acceleration of demographic transition found in Turkey and the Maghreb to be correlated with migration to Europe suggests that, if a similar relation were to apply to any migration from high to low birth rates countries, then international migration would have produced a global demographic benefit,

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Table 4: Estimation of Net Migration using UN sources – Example of Morocco, 1950-2000

Year	Total Population (1)	Birth Rate [t,t+5] (2)	Death Rate [t,t+5] (3)	Natural Increase [t,t+5] (4)	Expected Population (5)	Net Migration [t,t+5] (6)
1950	8953	0,0504	0,0257	0,0247	8953	2
1955	10132	0,0504	0,0227	0,0277	10130	-11
1960	11626	0,0501	0,0196	0,0305	11637	-218
1965	13323	0,0482	0,0174	0,0308	13541	-231
1970	15310	0,0456	0,0157	0,0299	15541	-474
1975	17305	0,0394	0,013	0,0264	17779	-365
1980	19382	0,0371	0,0114	0,0257	19747	-45
1985	21995	0,0323	0,0089	0,0234	22040	-161
1990	24564	0,0267	0,0074	0,0193	24725	-214
1995	26839	0,0244	0,0066	0,0178	27053	-229
2000	29108	0,0232	0,006	0,0172	29337	-158
2005	31564	-	-	-	31722	
1950-2005						-2104

Source: Columns (1) to (3) United Nations 2003; Columns (4) to (6) computed by the author as: (4)=(2)-(3) ; (5)=(1)*Exp[(4)x*2.5] ; (6)=(1)-(5)

N.B. Table 4 shows how migration flows can be estimated (very imperfectly) in the absence of any reliable source on migration, using the United Nations demographic database. Cumulated migration from 1950 to 1990

Table 5: Migration and Fertility in Selected MENA Countries at the Time of Maximum Variation in Fertility

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Country	Cumulated	Total Fertility Rate

Table 7: Remittances and births rates in Morocco 1980-2000

Year	BR per 1000	Remittances (MDir) Current prices	Remittances (MDir) 1980 prices	Year	BR per 1000	Remittances (MDir) Current prices	Remittances (MDir) 1980 prices
1980	39.0	4211	4211	1991	28.1	18739	8681
1981	38.1	5484	4556	1992	27.3	19796	8471
1982	37.2	5697	4866	1993	26.6	19876	8116
1983	36.1	6787	5034	1994	24.2	19261	7559
1984	35.0	7990	5669	1995	23.9	18711	7293
1985	33.8	10378	6552	1996	23.6	20622	7173
1986	32.7	13548	7394	1997	23.2	20255	7406
1987	31.6	14135	7361	1998	22.8	22025	7356
1988	30.8	11683	6956	1999	22.4	21120	7851
1989	29.9	12400	7264	2000	21.9	25784	8685
1990	29.0	17688	8009				

Source: Annuaire statistique du Maroc, various years.

Table 8: Emigration to the Gulf and the Transition of Fertility in Egypt at the time of the Gulf War (1991), by Governorate

Governorate	Returnees from Iraq & Kuwait per 1,000 inhabitants	Percentage of the Fertility Transition Completed in 1991
Port Sa'îd	4.52	76.1%
Cairo	5.26	74.1%
Alexandria	4.02	65.1%
Suez	3.91	60.1%
Qalyûbiyya	2.66	59.3%
Buhayra	6.18	58.8%
Gharbiyya	11.61	58.7%
Minûfiyya	6.70	56.4%
Aswân	2.17	56.2%
Dumyât	13.03	53.7%
Daqahliyya	14.29	53.5%