

*ESTIMATION OF INTERNATIONAL MIGRATION FOR VIETNAM, 1979-1989*¹

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This paper details the various steps adopted in the estimation of international emigration from Vietnam by sex and age between the dates of the first two modern censuses conducted in 1979 and 1989. The measurement of Vietnamese emigration is based on existing intercensal projection methods. The procedure is applied to Vietnamese census data to obtain preliminary estimates of Vietnamese intercensal emigration. A separate estimate of intercensal emigration is derived from a combination of data on the Vietnam-born population in the censuses of the United States, Canada, and Australia, three major receiver countries of Vietnamese emigration, and of data on refugee movements collected by the United Nations High Commissioner for Refugees. The paper evaluates the two sets of estimates and discusses the relative appropriateness of the data sources for the estimation of intercensal emigration.

Since the end of the Vietnam war and the reunification of North and South Vietnam in April 1975, Vietnam experienced massive streams of outmigration. The political and economic situation of Vietnam after 1975 drove those closely associated with the US or the South Vietnamese government, Catholics, ethnic Chinese from both north and south Vietnam, and other groups to flee the country. According to statistics collected by the United Nations High Commissioner for Refugees (UNHCR), since the fall of the Saigon regime in April 1975, about

1.4 million people have left Vietnam.² Of these, 60 percent have left illegally by boat to whichever Southeast Asian country they would reach first,³ or overland through Cambodia to Thailand.⁴ The remaining 40 percent have departed directly from Vietnam to resettlement countries after applying to an UNHCR-sponsored program, known as the Orderly Departure Program (ODP), and subscribed by several Western countries. 94 percent of those who left Vietnam have eventually resettled in Western countries (UNHCR, 1995b).

Recently, official data on the Vietnamese population have become available through the 1979 and 1989 censuses (Vietnam General Statistical Office, 1983; Vietnam Central Census Steering Committee, 1994). In the absence of a continuous registration system of vital events, the usefulness of two successive census age distributions for demographic analysis is well known, because the difference between counts of the same cohort at two different points in time, in a closed population, is the result of mortality (United Nations, 1983). Yet, it is often impossible to arrive to full consistency between census enumerations at two points in time only by accounting for intercensal deaths. One major obstacle to this effort is successive census enumerations that may be differentially complete. The second is the lack of information on intercensal net migration on a sex and age specific basis. Data on international migration in Vietnam are a particularly weak link in this process. UNHCR counts of refugee movements are so far the only data that allow to gauge levels of Vietnamese emigration. But, because they only reflect the volume of emigration from Vietnam, and do not provide any information on the age-sex structure of emigrants, they are of limited demographic value.

This paper attempts to fill this gap, by producing estimates of Vietnam's international

migration by age and sex between October 1, 1979 and April 1, 1989, the two census dates. These estimates are derived using the residual method for estimating net migration from two census age distributions, a procedure that involves allocating population changes not accounted for by fertility and mortality to migration. It is first applied to data from Vietnam's 1979 and 1989 censuses to obtain preliminary estimates of intercensal net migration. The method requires that all errors and discrepancies be accounted for prior to defining the residual as net migration. Differential census enumeration completeness, incomplete registration of births and deaths, or ambiguities as to whether successive census counts include the military population would enter directly in the estimation of net migration if no prior adjustment is made. In this case, net migration may be confounded with the net balance of errors. The two Vietnamese censuses were taken at the beginning and at the end of the 1980s, a period characterized by population redistribution policies and a highly mobile population. Under these circumstances, it may have been difficult to accurately enumerate persons away from their usual place of residence. To reduce the risk of bias from these sources, the paper proposes another approach to the measurement of Vietnamese intercensal emigration, one that uses a combination of independent data sources. Vietnamese emigration can be estimated by referring to information on Vietnamese immigration to the United States (US), Canada, and Australia, three major receiver countries of Vietnamese refugees. Estimates of Vietnamese immigration to countries of destination are obtained by applying the residual method to Vietnam-born persons enumerated in pairs of successive censuses of the countries of resettlement. These results are combined with UNHCR counts on Vietnamese refugee movements to yield estimates of intercensal emigration

during the period between Vietnam's two censuses. The principal objective is the choice of a best estimate that can be used to adjust one or the other census age distribution for the effects of net international migration during Vietnam's intercensal period.

PREVIOUS ESTIMATES OF VIETNAMESE EMIGRATION

Emigration from Vietnam to Countries of Resettlement of Vietnamese Refugees

In the late 1970s, UNHCR established a continuous recording system of monthly and annual counts of arrivals of Vietnamese refugees to camps in "first asylum" countries, resettlement departures to countries of final destination, and counts of departures directly from Vietnam through the ODP.

Figure 1 displays annual movements of refugees, by type of movement, and departure, for the period between 1975 and 1995.

[Figure 1 about here]

It is apparent from this figure that the outflow of refugees was marked by dramatic fluctuations. In mid-1976, the number of Vietnamese leaving by boat consisted of a few hundreds per month, but it increased soon thereafter, from about 23,000 in 1976-77 to 30,200 in 1978. By the end of 1978, there were about 67,000 boat people registered in Southeast Asian refugee camps. Thereafter, the number of arrivals climbed to a peak, with more than 200,000 in 1979. This

translated to about 150,000 Vietnamese refugee in camps at the end of 1979, as monthly arrivals were not countered by a comparable number of resettlement departures.⁵ The pressure of growing numbers of arrivals to first asylum countries was so strong that some Southeast Asian countries had started to turn away a large number of boats.

After a Conference on Refugees was organized in Geneva in July 1979, Western nations' resettlement pledges resulted in large numbers of departures from the camps in the second half of 1979 and 1980. During this period, almost 300,000 boat people departed first asylum countries for their final destinations, with 55,000 persons still awaiting resettlement at the end of 1980, a massive reduction from the large numbers in camps prior to the Geneva conference.

Arrivals to first asylum countries leveled off to more moderate levels upon the establishment of the ODP program, in June 1979, but they rose again from 21,500 in 1986 to 74,000 in 1989, possibly the effect of a temporary suspension of the ODP in 1986-87. In 1989, the establishment of a screening process, set up to distinguish true refugees from economic migrants, slowed down the number of arrivals, but also the number of resettlement departures. After 1988, the total camp population increased again, as the majority of new arrivals were regarded by third countries as economic migrants and denied the right to resettle there.

Figure 1 also shows that, while refugees leaving under the auspices of the ODP represented a very small proportion of all Vietnamese refugees until about 1982, for the first time in 1984, they outnumbered boat and land people. However, only upon definition of the new refugee acceptance criteria in 1989 did the program come to represent the major channel of departure from Vietnam.

Of Vietnamese refugees who resettled to Western countries between 1975 and 1995, 64 percent were accepted by the US, 12 percent went to Australia and 12 percent to Canada. Among European countries, France received the largest number, although this number only represents 3 percent of total resettlements (See Table 1).

[Table 1 about here]

Although UNHCR statistics allow to quantify the volume of Vietnamese emigration, they are of limited demographic value, as they do not record the demographic characteristics of the refugee population. Owing to the absence of information on the age-sex structure of the migrant population, these counts cannot be used to adjust one or the other census age distribution for the effects of net migration, and as such are inadequate for analytical purposes.

Emigration from Vietnam to Cambodia

One substantial portion of Vietnamese emigration during Vietnam's intercensal period consisted of a large number of Vietnamese settlers who crossed the land border to Cambodia following Vietnam's invasion on Christmas day 1978. Yet, while UNHCR statistics allow to make some headway towards quantification of the exodus of refugees from Vietnam, the absence of data on Vietnamese emigration to Cambodia during the decade of Vietnamese occupation from Christmas day 1978 to September 1989 is problematic. Uncertainty surrounds both the magnitude and the timing of the flows.

Ea (1990:10) gives the total number of Vietnamese in Cambodia in 1980 between 300,000 and 500,000. Kiernan (cited in Banister and Johnson, 1993:97) estimates a national total Vietnamese population of approximately 350,000. Banister and Johnson choose a figure of 500,000 Vietnamese settlers because it is in the range of 300,000-700,000 of most estimates of less interested observers. The figure of 500,000 was also admitted by Phnom Penh officials to the Economist Intelligence Unit (Banister and Johnson, 1993:97). Nguyen-vo (1992:146) reports that upon withdrawal of Vietnamese troops in September 1989, there were about 400,000-450,000 Vietnamese settlers in Cambodia.

One component of Vietnamese migration to Cambodia was return migration of Vietnamese citizens of Cambodia who fled the country between 1970 and 1978, expelled by the Lon Nol government (Ea, 1987: p. 7), the other was new migration of Vietnamese settlers who established themselves as shop owners, vendors, farmers, or fishermen. This second component is estimated at about 400,000 (Heuveline, 1996:31). While the 200,000 Vietnamese troops were gradually withdrawn between 1986 and the end of 1989, it is thought that the an imprecise number of Vietnamese settlers have remained behind (Banister and Johnson, 1993).

Even if we believed Banister and Johnson's preferred estimate of 500,000 Vietnamese arrivals in Cambodia between the end of 1978 and 1989, of which 200,000-300,000 emigrated before the end of 1979 (Ea, 1981:222) and may have not been counted in the 1979 census, we would still be left with 200,000-300,000 people emigrating to Cambodia in the intercensal decade --- and who may have been enumerated in the 1979 census, but not in the 1989 census --- about whom we know nothing. Some may have eventually reached Thai refugee camps, and may

therefore be included in UNHCR counts of Vietnamese land refugee arrivals to UNHCR camps. According to reports by Vietnamese refugees, crossing the border from Vietnam to Cambodia was not a difficult undertaking, and once in Cambodia, Vietnamese newcomers could easily obtain the necessary papers to Thailand upon payment of small bribes (Nguyen-vo, 1992:147). Ea (1981:222) speculates that the majority of the 200,000-300,000 civilians who settled in Cambodia by the end of 1979 may have indeed crossed the border over to Thailand. Yet, the cumulative number of Vietnamese land arrivals in Thai camps between 1976 and 1995 only amounts to about 43,000 (UNHCR, 1995b), a figure by far below Ea's estimate of 200,000-300,000 Vietnamese settlers in Cambodia by the end of 1979. Confirmation of the small number of Vietnamese land people in Thai refugee camps can also be found in several studies on Vietnamese refugees (Viviani, 1984; Hitchcox, 1990). This suggests that most Vietnamese who settled in Cambodia did actually stay there.

To unravel the puzzle of Vietnamese emigration to Cambodia, consideration was also given to the possibility that Vietnamese settlers may have been enumerated in the 1989 Vietnam census. The "Special Enumeration Groups," a category enumerated separately in the 1989 census by the Ministries of Internal Affairs, Foreign Affairs, and National Defense (Banister, 1993:73-78), is believed to include Vietnamese cadres, technicians, experts and advisers in Cambodia who filled the spaces left empty by the massacres under Pol Pot and the exodus triggered by the Vietnamese invasion (Banister and Johnson, 1993:77). As to the question of whether settlers were enumerated therein, the age and sex composition of the 1.04 million people in these special groups is disproportionately biased towards males ages 15-64, with a total ratio

of six males to one female, and only a few tokens of children. This leads one to discard this hypothesis, because a large portion of Vietnamese emigration to Cambodia may have consisted of entire family nuclei (Ea, 1981:222).

Confirmation of the failure of the 1989 census to enumerate Vietnamese settlers to Cambodia is also found in census reports. Acknowledging the absence of information on international migration in Vietnam 1989 census, the 1989 Census Steering Committee refers to international migrants as “.... the net movement of persons in the intercensal period who had left to seek residence in other countries, or *who had moved into neighboring countries to farm or for some other purposes* [emphasis mine]” (Vietnam Central Census Steering Committee, 1990:40). It is likely that this group refers to the Vietnamese settlers in Cambodia, who were counted in the 1979 census but not in the 1989 census.

ESTIMATING VIETNAMESE EMIGRATION DURING THE 1979-1989 INTERCENSAL PERIOD

Measuring Vietnamese Emigration from Vietnam's 1979 and 1989 Census Data

Estimates of international migration can be obtained by the application of the life table forward and reverse survival methods to a pair of successive censuses (United Nations, 1970:26-27; Shryock and Siegel, 1976:359-360). With this method, estimates of net migration by age groups can be calculated allowing for the components of population change, according to the formula:

$$I_a - E_a = (P(1)_a - sP(0)_{a-t}),$$

where $I_a - E_a$ represent the difference between immigrants and emigrants, a is age at the end of the period, $P(1)_a$, the population at this age in the second census, $P(0)_{a-t}$ the population t years younger at the first census, and s the intercensal survival rate for this age group. This formula covers all age cohorts except those born in the intercensal period. For cohorts born in the intercensal period, the equivalent formula is:

$$I_a - E_a = (P(1)_a - sB),$$

where B represents intercensal births (Shryock and Siegel, 1976:357).

The application of the life table forward and backward survival procedures to Vietnam's two successive census enumerations yields an estimate of intercensal net migration. With the forward survival method, Vietnamese net migration M of persons in the cohort aged x to $x+n$ at time t is equal to:

$${}_nM_x = {}_n P_{x+a}(t+a) - [{}_n P_x(t) \times ({}_n L_{x+a} / {}_n L_x)]$$

And, by reverse survival procedure, it is equal to:

$${}_nM_x = [{}_nP_{x+a}(t+a) / ({}_nL_{x+a}/{}_nL_x)] - {}_nP_x(t)$$

where

${}_nM_x$ = net Vietnamese migration over a years to the cohort aged x to $x+n$ in first census and aged $x+a$ to $x+a+n$ at second census

a = length of the intercensal period in years

x = age

n = cohort width

t = date of first census

$t+a$ = date of second census

${}_nP_x$ = Enumerated population in cohort aged x to $x+n$ in first census

${}_nP_{x+a}$ = Enumerated population in cohort aged $x+a$ to $x+a+n$ in second census

${}_nL_{x+a}/{}_nL_x = a$ year survival ratios, that is the ratios of the size of the cohort aged $x+a$ to $x+a+n$ to the size of the cohort aged x to $x+n$ in the stationary population of the intercensal life table.

The former procedure consists of applying life table survival ratios to the population enumerated in the first census to obtain an expected number of survivors in the following census. Subtraction of the survivors of the first census from the population enumerated in the second census yields an estimate of net migration M , or the number of Vietnamese who emigrated in the intercensal period and survived to the end of the period, and is equivalent to the assumption that

all migration occurs just before the second census. This estimate overstates the population exposed to the risk of death during the intercensal period and is deficient as a count of emigrants by the number of deaths to the migrant cohorts during the intercensal period.

With the reverse survival procedure, application of reverse survival ratios to “young” the population enumerated in the second census, and subtraction of the population at the first census yields another estimate of net migration MN . This estimate combines the number of Vietnamese persons who emigrated during the intercensal period and survived to the end of the period and those who died during the period, and is equivalent to the assumption that emigration occurred just after the first census (United Nations, 1970:26).

The average of the two estimates, MO , implies a more meaningful assumption regarding the timing of emigration than that implicit in either forward or reverse survival procedures. This average will include migrant deaths with the implicit assumption that deaths and migration are evenly distributed over the intercensal period or that all migration occurs in the middle of the period (United Nations, 1970:26).

To allow for the effect of mortality of migrants dying during the intercensal period, life table survival ratios ${}_nL_{x+a}/{}_nL_x$ are derived from Vietnam’s 1989 male and female life tables reported by Vietnam’s General Statistical Office (1991:116).⁶ Because the interval between the dates of the two censuses, October 1, 1979 and April 1, 1989 is equivalent to 9.5-year, while only an abridged life table is available for 1989 in conventional 5-year age groups, the following steps are adopted to compute 9.5-year survival ratios: (1) Coefficients based on the Sprague formula (Shryock and Siegel, 1976:555) are used to interpolate the series of ${}_5L_x$ ’s by single year of age;

(2) a series of ${}_1L_{x+0.5}$ is constructed by taking the average of ${}_1L_x$ and ${}_1L_{x+1}$ on the assumption that mortality increases linearly within each pair of consecutive single years of age; (3) 9.5-year survival ratios are calculated by regrouping the values of ${}_1L_{x+0.5}$ thus obtained in 5-year age groups. To make 1989 population counts comparable with 9.5-year survival rates, the last two steps are also applied to the 1989 census age distribution available in single year of age (Vietnam Central Census Steering Committee, 1994).

The estimation of deaths for the age cohorts born in the 9.5-year intercensal period requires special treatment since these groups are exposed to the risk of death in Vietnam for less than 9.5 years. Survival rates for the population under 5 and 5-9⁷ during the intercensal period are computed respectively as $[\frac{5}{\theta}(\frac{L_0}{5} * l_0)]^{1.25}$, or the probability of survival for 1.25 years for children aged 0-4 at the 1989 census and emigrated in the intercensal decade,⁸ and $[\theta(l_{10}/l_5)]$, or the probability of survival for 2.5 years for children emigrated in the intercensal decade and aged 5-9 at the 1989 census.. The forward and reverse survival procedures are then applied in the same fashion as for the older age groups, with intercensal births providing the initial population for the first two age groups.⁹

The main problem with intercensal survival procedures to estimate migration, is that migration is estimated as a residual after all other components of change have been removed. If the sources of error in the data are not known, and no prior adjustment is made, all errors and discrepancies in the data enter directly into the determination of the residual, and any changes due to errors are interpreted as net migration. According to the authors of the 1989 census report, underenumeration in the 1989 census among males aged 15-24 is great, but its extent is not

known (Vietnam General Statistical Office, 1991:19). Table 2 shows estimates obtained from the intercensal projection method for males and females (detailed calculations of these procedures are presented in Appendix Table A1 and A2).

[Table 2 about here]

If these estimates truly represented the volume of net migration, there would have been about 1,240,000 male emigrants between ages 15 and 29, and about 440,000 female emigrants between ages 15 and 24, who left Vietnam between October 1, 1979 and April 1, 1989. To these, one should add the relatively smaller numbers of exits estimated for younger and older age groups for a grand total of 1,947,000 male emigrants and 821,000 female emigrants and 2,768,000 emigrants for the two sexes combined. These estimates are almost certainly too high for the period under consideration and are 1,000,000 people higher than the total count of 1,790,000 refugees reported by UNHCR for the longer period from 1975 to 1995 (see footnote 2). The suspicion is that they are a mixture of net migration and the net balance of errors in the basic data due to differential census coverage. The estimates also imply some net immigration, as shown by the number of entries concentrated especially among middle aged females, and to a smaller extent among middle aged males. References to return migration during the period between the two censuses cannot be found anywhere, while repatriation of refugees by UNHCR began only after June 1989, following the 1989 census. Differential enumeration between censuses and misreporting of age provide a more likely explanation for these results as

undercounts selective of persons in certain age groups in 1979, especially of middle-aged persons (Banister 1993), would result in fewer survivors projected from 1979 to the date of the second census and a larger, possibly positive, residual when the projected population is subtracted from the population enumerated in 1989. Similarly, age overstatement among males in 1979, because men older than 60 received higher benefits and were exempt from social work (Vietnam General Statistical Office, 1991:20), would result in evacuated age categories below age 60, hence in fewer survivors at these ages projected to the date of the second census and larger residuals. Positive residuals would also be produced from age overstatement among females in 1989, because in rural areas women aged 45 and above were exempt from public service (Vietnam General Statistical Office, 1991:18-19). A transfer of people from ages below 45 to older age groups would inflate the numbers enumerated in 1989 at these ages relative to the number of survivors projected from 1979. Unfortunately, the absence of more detailed information on sources of errors in the data does not allow one to evaluate what proportion of “emigrants” estimated from Vietnam’s two census age distributions should be allocated to actual emigration and what proportion to differential census enumeration completeness.

Measuring Vietnamese Emigration from Immigration Data in the Censuses of the United States, Canada and Australia

The censuses of the US, Canada and Australia, with their questions on place of birth, are unique sources of consistent, up-to-date information on the immigrant stocks. In fact, the number of Vietnamese-born persons enumerated in a census can be used to estimate immigration, because

persons born in a different place from that in which they are enumerated are clearly migrants since they must have moved from elsewhere, presumably their place of birth, to the place of enumeration at some time (Zlotnik, 1987:936).¹⁰

The input data for the estimation of Vietnamese immigration is provided by the censuses conducted at dates that are closest to the two Vietnamese censuses of October 1, 1979 and April 1, 1989: for the US, the censuses of April 1, 1980 and April 1, 1990, for Canada the censuses of June 3, 1981 and June 4, 1991 and for Australia, the censuses of June 30, 1981 and June 30 1991 (See Figure 2). In all three countries of resettlement, censuses taken prior to the 1980s do not enumerate Vietnamese-born persons as a separate category, and are therefore inadequate for providing information on Vietnamese emigration prior to 1980 (Barringer *et al.*,1993:37; Australia Bureau of Immigration and Population Research, 1994).

[Figure 2 about here]

The forward and backward projection procedures applied earlier to Vietnam's census counts to estimate emigration can be similarly applied to the Vietnam-born population enumerated in the censuses of the United States, Canada and Australia to obtain an estimate of Vietnamese intercensal immigration to these countries.¹¹

To allow for the effect of mortality of migrants dying during the intercensal period in the country of resettlement, life table survival ratios ${}_nL_{x+a}/{}_nL_x$ are derived from the intercensal life tables of the resettlement countries: for the US the 1985 life tables (National Center for Health

Statistics, 1988), for Canada and Australia, the 1985 life tables (Keyfitz and Flieger, 1990).

Appendix Tables A3-A8 show the detailed calculations for males and females by country of resettlement. A total of 333,898 Vietnamese (177,459 males and 156,439 females) immigrated to the US between the 1980 and 1990 censuses, 73,721 (36,961 males and 36,760 females) immigrated to Canada during the 1981-1991 intercensal period, and 83,011 (42,828 males and 40,183 females) immigrated to Australia in the 1981-1991 period.

The age and sex structure of Vietnam-born persons who immigrated to the US, Canada, and Australia during the intercensal periods is shown in Table 3. It can be seen that Vietnamese immigrants are quite young, with the majority aged between 15 and 40, and little differences across country of resettlement. This is not surprising, since migration is usually heavily concentrated among younger age groups (Gordon, 1989). But contrary to expectations, the sex composition of Vietnamese-born enumerated in the 1990, and 1991 censuses of the US, Canada and Australia is fairly balanced. Only in the United States and Australia, is the excess of males over females more pronounced, especially between ages 15 and 34, while in Canada the sex ratio is balanced at almost all ages, with females exceeding males above age 30.

[Table 3 about here]

Some Difficulties of Measurement of Vietnamese Emigration from Data on Immigration to Countries of Resettlement

Estimation of Vietnamese emigration during the 1979-1989 intercensal period obtained solely from the estimated numbers of immigrants to resettlement countries requires several *ad hoc*

procedures to make adjustments for the number of emigrants who are missed due to time lags between the dates of the Vietnamese censuses and the dates of the censuses of the countries of resettlement, and to unmeasured time lags between the date of departure from Vietnam and the date of resettlement to third countries. In particular, the estimation of Vietnamese immigration to the US in the 1980-1990 period, and to Australia and Canada in the 1981-1991 period implies an exclusion of those who departed Vietnam between October 1, 1979, the date of the first Vietnam census, and April 1 1980, June 3, 1981, and June 30, 1981, the dates of the US, Canadian and Australian censuses (See Figure 2 above).

Moreover, the number of Vietnamese arrivals to the US is not an accurate representation of the number of departures from Vietnam during the same period. While ODP applicants typically left Vietnam directly to one of the countries participating in the program, this is not so for boat and land people, who spent an unknown number of months in refugee camps in "first asylum" countries, before being accepted for resettlement in third countries. While resettlement may have been relatively fast for selected groups claiming family reunification or employment ties to the US (Hitchcox, 1990:125), it may have been very slow for other less connected groups. It is not uncommon among refugees in Southeast Asian camps to have spent more than two years in first asylum countries awaiting resettlement (Hitchcox, 1990:263). Unmeasured time lags between the time refugees departed Vietnam and the time they reached resettlement countries complicate the estimation of Vietnam intercensal emigration in the following ways:

a) Vietnamese emigrants who left Vietnam before October 1, 1979, the date of the first Vietnam census, but reached the US after April 1, 1980, the date of the US census will contribute

to the estimated Vietnamese immigration to the US in the 1980 and 1990 intercensal period, but will have to be subtracted out because they were not enumerated in the 1979 census of Vietnam.

b) Vietnamese emigrants who left Vietnam after October 1, 1979, and reached the US before April 1, 1980, will not be included in the estimate of new Vietnamese immigration to the US in the 1980-1990 intercensal period because they were already enumerated in the US 1980 census. In the estimate of the volume of emigration from Vietnam, they will have to be added to the volume of Vietnamese immigration to the US in the 1980-1990 period.

c) Vietnamese emigrants who left Vietnam before April 1989, the date of the second Vietnamese census, but entered the US after April 1, 1990 will not be enumerated in the US 1990 census, and therefore will not contribute to the estimate of Vietnamese immigration to the US between the two censuses of 1980 and 1990. However, because they left Vietnam before the 1989 census, they must be included in the reconstruction of Vietnam's intercensal emigration.

d) Vietnamese emigrants who left Vietnam after April 1989 but entered the US before the 1990 census will be included in the estimate of net intercensal immigration but will have to be subtracted out because they were in Vietnam at the time of the 1989 census.

Similar problems are presented by the estimation of intercensal Vietnamese immigration to Canada, and Australia, only with different time lags between the dates of their respective censuses and the dates of the Vietnamese censuses.

Figures 3 and 4 display monthly boat people movements over the periods encompassing the 1979 and 1989 Vietnam censuses.¹² These figures offer some indication of the sizes of groups a) through d), and of the potential impact of refugee movements on the estimation of

Vietnam's intercensal emigration.

From Figure 3, peak illegal emigration from Vietnam, at best represented by the number of boat people arriving in Southeast Asian camps, preceded the date of the 1979 census, the case of the group in (a). However, by the time of the 1980 US census, a large number of refugees were still in camps, as the flow of arrivals to first asylum countries in 1979 was far too massive for Western countries to be able to absorb it at a fast pace. This suggests that a substantial fraction of those who resettled to the US after April 1980, may have left Vietnam before October 1, 1979. On the other hand, due to the slow pace of resettlement, the number of boat people who left Vietnam after October 1, 1979, but reached the US before April 1980 in (b), is probably comparatively small.

[Figure 3 about here]

In the late 1980s, the number of boat people arrivals to first asylum countries and resettlement departures to third countries was far smaller than the corresponding numbers in the late 1970-early 1980s, as the majority of those who left Vietnam during this period were ODP applicants. Moreover, the probability of boat people being resettled in a third country was relatively low, as Vietnamese arriving to refugee camps in Southeast Asian countries and Hong Kong were likely to be classified as economic migrants and be denied resettlement.

[Figure 4 about here]

Figure 4 suggests that upon the establishment of the screening process in June 1989, the number of residents in the camps increased and stabilized around 110,000. Some of these may have left Vietnam prior to the 1989 census, but, may have been denied resettlement in third countries. For all we know, they may be among the 77,000 returnees to Vietnam, or the 38,000 still in camps in March 1996 (*New York Times*, 1996). This indicates that the numbers of refugees who left Vietnam before the 1989 census but resettled to the US after the US 1990 census in (c), and of those who left after the 1989 census but reached the US before April 1, 1990 in (d), may be indeed small. However, the difficulty to account for those who departed Vietnam prior to April 1989 but never made it to the US may jeopardize the accuracy of estimation of Vietnam's intercensal emigration.

Given the problems of measurement of Vietnamese emigration solely from information on immigration from pairs of census enumerations of the Vietnam-born population in the US, Canada and Australia, an alternative approach to estimating Vietnam's intercensal emigration is proposed, one that combines data on the Vietnam-born population enumerated in the censuses of resettlement countries and UNHCR data on refugee movements.

A Comparison between Data on Vietnamese Immigration in the Censuses of the Countries of Resettlement and UNHCR Data on Resettlement Departures

To assess comparability between resettlement departures from UNHCR records on refugee movements and immigrant entries to the US, Canada and Australia from the censuses of these

countries, Table 4 compares the stocks of Vietnam-born persons who immigrated to the US, Canada and Australia estimated from the survival rate procedure based on census counts at destination, with the number of Vietnamese resettlements to these three countries recorded by UNHCR for the same years.

[Table 4 about here]

The difference is greatest for the United States, with the number of resettlements recorded by UNHCR exceeding the number estimated from US census data by 17 percent for the period between April 1 1980, and April 1, 1990. Australia, exhibits a difference of 7 percent for the 1981-1991 period, while the counts are closest for Canada, with only a 2 percent difference for the same period.

How can the discrepancy for the US be explained? Although census data on immigration are comprehensive with respect to all foreign-born persons in the US at the time of the census regardless of their legal status, and include aliens and citizens, persons having permanent residence status, and refugees (Warren and Passel, 1987:382), there are several reasons why US censuses may underenumerate Vietnam-born persons. These include a tendency for those born abroad to report themselves as natives or, for Vietnamese-born of Chinese descent, to report themselves as Chinese-born, differential coverage between censuses, with better coverage of Vietnam-born persons in the 1980 census relative to the 1990 census, and differences between the census sample, on which data on the foreign-born population are based, and the 100 percent

tabulations. Similarly, UNHCR data on resettlement departures may be in turn inflated by an unknown proportion of double counts. Refugees accepted for resettlement in the US were likely to spend about 20 weeks in Refugee Processing Centers (RPCs) in Indonesia and the Philippines, where they received language classes, cultural orientation and pre-employment training (Hitchcox, 1990:130-131). This resettlement process may have produced some double counting as some refugees were counted for the first time as resettlement departures when they left “first asylum” camps for the RPCs, only to be counted again once they departed the RPCs for the US. In recent years, UNHCR has devoted efforts to correct annual totals for double counting errors, with the results that recently published series are more accurate than earlier ones (personal communication with Ertan Corlulu, Resettlement Statistics, UNHCR, Geneva, 21 December 1995). To minimize the impact of double counting errors on the total counts of resettlement departures between 1980 and 1990, only the most recent series were used here. Moreover, despite the discrepancy between UNHCR counts and census counts, it is noteworthy that UNHCR counts of resettlement departures compare well with the total number of refugee arrivals to the US reported in Barringer *et al.* (1993:34) for the full 1980-1990 period (457,152 resettlement departures according to UNHCR data are only 5 percent less than 482,000 reported in Barringer *et al.*). These counts represent the total number of physical arrivals of Vietnamese refugees to the US, including both non-immigrant and immigrant arrivals, and were estimated by these authors from unpublished records provided by the State Department, the Immigration and Naturalization Office, the Office of Refugee Resettlement, and its predecessor, the Indochina Refugee Program.

Measuring Vietnamese Emigration from UNHCR Data on Refugee Movements, 1979-1989

Because UNHCR counts show a fair degree of consistency with the number of immigrants to the three major countries of resettlement estimated by the survival rate procedure, and, for the US, with those recorded by the independent data sources reported in Barringer *et al.* (1993), UNHCR data are regarded as a reliable source of information on the volume of emigration during Vietnam's intercensal period. In particular, the counts of boat and land arrivals to refugee camps in first asylum countries and direct ODP departures to countries of resettlement can be taken to reflect the number of departures from Vietnam minus an unknown proportion lost at sea.

Estimating the volume of Vietnamese emigration from UNHCR data on arrivals to refugee camps and ODP departures presents several advantages over the estimation of Vietnamese emigration from information from two successive census enumeration of Vietnam-born persons in the US, Canada and Australia. First, it does not require any adjustment for different time lags between the date of the Vietnam censuses and the dates of the censuses of the three countries of resettlement, or for unmeasured time lags between the date of departure from Vietnam and the date of resettlement in the countries of final destination. Second, the date of departure from Vietnam coincides with the date of arrivals to first asylum camps, as the journey time by boat generally required only three to four days (Viviani, 1984; Hitchcox, 1990). Third, UNHCR data on arrivals to first asylum camps and ODP departures to resettlement countries enumerate all refugees regardless of their final destination, and include refugees who left

Vietnam after the 1979 census and who, by the time of Vietnam 1989 census, were still awaiting resettlement in Southeast Asian camps.

From Table 5, a total of 559,736 refugees arrived to camps in “first asylum” countries or departed from Vietnam under the auspices of the ODP between October 10, 1979 and April 1, 1989. This figure best reflects the volume of emigration from Vietnam in the 1979-1989 intercensal period, with the only exclusion of Vietnamese settlers in Cambodia.

[Table 5 about here]

In order to estimate the number of Vietnamese emigrants during the intercensal period who survived to the end of the period and who would have been counted in the 1989 census had they not departed Vietnam, the volume of the survivors of departures from Vietnam during Vietnam’s intercensal period, ought to be diminished by the proportion who died during this period while in refugee camps or in countries of resettlement.

As shown in footnote 11 of this paper, M/MO is the ratio of the total number of Vietnamese-born persons immigrating to the country of resettlement during that country’s intercensal period and surviving to the end of the period to the combined number of Vietnamese-born enumerated in the censuses of the country of resettlement who entered during the intercensal period and survived to the end of the period and of those who died during the period. This ratio is equivalent to the survival probability of Vietnamese immigrants who entered the US, Canada and Australia during the intercensal period to the time of the census (1990 or 1991).

Its complement, $1 - M/MO$, represents the probability of dying during the period, and was calculated for the US 1980-1990 intercensal period and for Canada and Australia 1981-1991 periods for each sex. The left column of Table 6 shows the probability of dying for the US 1980-1990 period. The right column shows the average of the probability of dying of Vietnamese immigrants to Canada and Australia for the 1981-1991 intercensal period.

[Table 6 about here]

Because the results obtained for the three countries of resettlement are very similar, the ratio M/MO for the US is employed to derive a single adjustment factor, on the assumption that the mortality experience of Vietnamese immigrants to the US is similar to that of their counterparts in Canada and Australia. A factor equal to 0.985243 is finally derived by taking the weighted average of the US male and female survival probabilities M/MO raised to the 0.95th power to reflect 9.5-year survival for the length of Vietnam's intercensal period. This single factor is applied to the grand total of 559,736 arrivals to refugee camps and ODP departures from Table 4, to obtain the total number of emigrants who left Vietnam during the intercensal period and survived to the end of the period. Thus, of the 559,736 persons who departed Vietnam between October 1, 1979 and April 1, 1989, 8,260 are estimated to have died and 551,476 survived. This yields an average annual death rate of 1.55 per 1,000. Such a low rate is not surprising, since the age structure of emigrants is quite young and death is a rare event at young adult ages. This rate is also consistent with an average annual death rate of 1.59 per 1,000 for the

1980-1989 period in refugee camps, computed from UNHCR vital records published for refugee camps in Thailand (UNHCR, 1991).

In order to adjust one of the two Vietnamese census age distributions for the effects of net migration, it does not suffice to know the volume of emigration. Knowledge of its age-specific intensity is also essential. For the sake of computation efficiency, a single schedule is employed to apportion the 551,476 persons surviving to the end of Vietnam's intercensal period to different ages. Because about 60 percent of Vietnamese refugees resettled in the US, and their age distribution is quite similar to the age distribution of their counterparts who emigrated to Canada and Australia, survivors are distributed according to the age and sex structure of Vietnamese-born enumerated in the 1990 census who immigrated to the US between 1980 and 1990, on the assumption that those who reached the US have the same age distribution of those who arrived to refugee camps. The estimate of the size and demographic structure of emigration from Vietnam between the 1979 and 1989 is shown in Table 7.

[Table 7 about here]

Not surprisingly, these estimates reflect much lower levels of intercensal emigration than those derived from Vietnamese census data in Table 2, because they only incorporate the actual counts of refugees who left Vietnam after the 1979 census and were not there to be enumerated in the 1989 census, and are free from errors due to differential census enumeration completeness, and age misstatement.

CONCLUSIONS

The aftermath of the Vietnam war and the reunification of North and South Vietnam in 1975 opened the population of Vietnam to massive streams of outmigration. The exodus of Vietnamese refugees started prior and immediately after the establishment of North Vietnamese control on Saigon in April 1975 and continued well into the 1990s. About 90 percent of Vietnamese refugees have resettled in the United States, Canada and Australia. Migratory flows to Cambodia during the decade of Vietnamese occupation 1979-1989 are also part of the story of Vietnamese emigration, although the cause of departure was of a different nature, since Vietnamese settlements in Cambodia were encouraged by the Vietnamese government whose objective was to reduce the overpopulation of the Red River delta in North Vietnam and redistribute people displaced in the South during the war (Ea, 1981:222).

The two modern censuses of Vietnam conducted in 1979 and 1989 represent the first official sources of data that allow the study of the Vietnamese population. Yet, the absence of information on international migration in these data collection efforts complicates attempts aimed at obtaining reliable demographic estimates using two successive census enumerations. This makes the measurement of Vietnamese emigration of even greater demographic significance.

This paper attempts to measure Vietnamese intercensal emigration from a variety of data sources. It first applies traditional intercensal projection techniques to Vietnam's two census

enumerations to estimate net migration as a residual after the other components of change, births and deaths, are accounted for. The estimates of emigration derived in this fashion are heavily biased upward due to the inability to distinguish net migration from the net balance of errors in the data, most importantly differential census enumeration completeness, to which intercensal projection techniques are particularly sensitive.

To remedy this problem and obtain more reliable estimates of the number of emigrants on an age and sex specific basis during Vietnam's intercensal period, an alternative approach is illustrated. This is based on a combination of counts of refugee movements documented by UNHCR and of data on Vietnamese immigration recorded in pairs of consecutive censuses of the US, Canada and Australia. The former set of data provides an estimate of the volume of Vietnamese emigration during Vietnam's intercensal period; the latter contributes the age-sex structure of Vietnamese persons who immigrated to the US, Canada and Australia in the period between censuses taken at dates that encompass or are very close to the dates of the Vietnamese censuses. Although these new estimates of Vietnamese intercensal emigration are free from errors in the data that bias the estimates derived from the Vietnamese censuses, they are nonetheless not fully accurate. The goal set forth in this paper is an ambitious one. The identification of all pieces of information on Vietnamese emigration since 1975 is a difficult task, mainly because the composition of migratory flows in the 1980s consisted of very diverse groups, and the documentation of these movements was complicated by the political, social and economic upheavals that took place in Vietnam in the aftermath of the Vietnam war. A case in point is the emigration from Vietnam to Cambodia during the decade of Vietnamese occupation.

Despite the meticulous accounting of Vietnamese emigration to receiver countries of Vietnamese refugees, that yielded a final estimate of 551,476 emigrants by age and sex who would have survived to be counted in the 1989 census had they not departed Vietnam, there remains an unknown amount of “residual” emigration from Vietnam to Cambodia -- possibly about 200,000-300,000 persons -- who could not be accounted for by the estimation procedure. The total absence of information on these flows makes it difficult to obtain an accurate measurement of intercensal emigration, and weakens the accuracy of the final results.

Figure 1. Vietnamese Refugee Movements. Boat + Land People and ODP Departures. 1975-1995

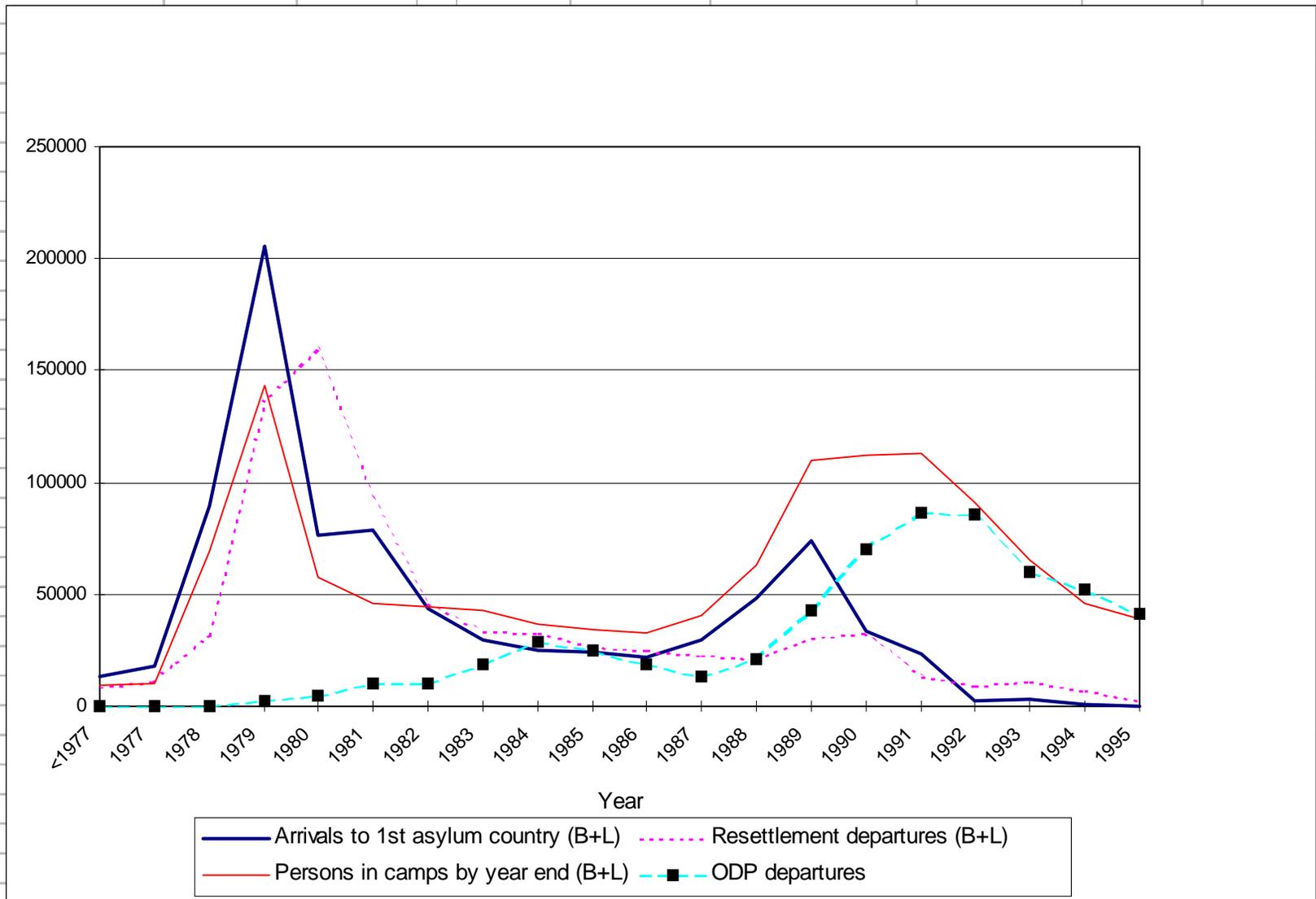


Figure 2. Chronological Succession of Censuses of Vietnam, the US, Australia, and Canada. 1979-1991

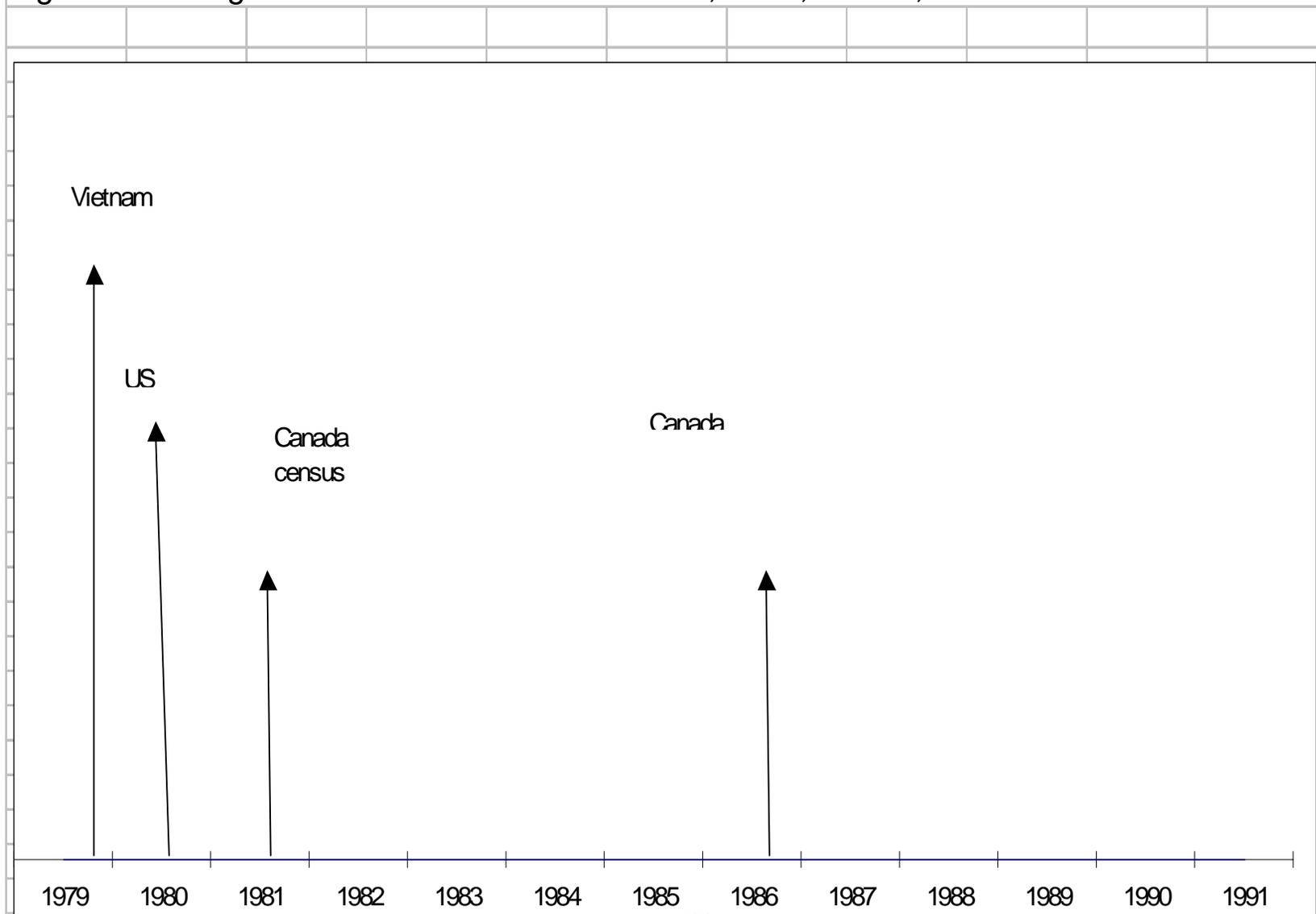
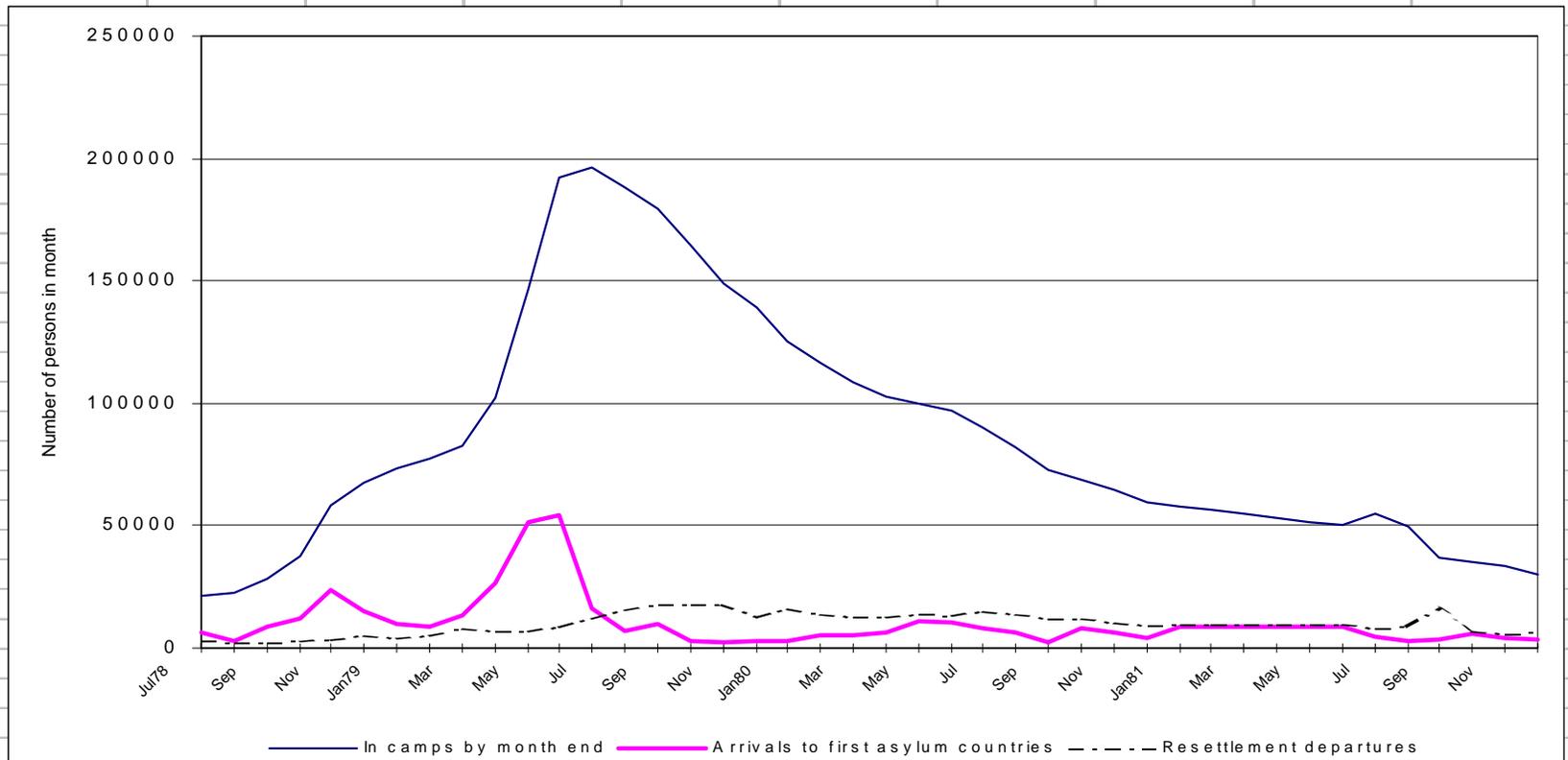


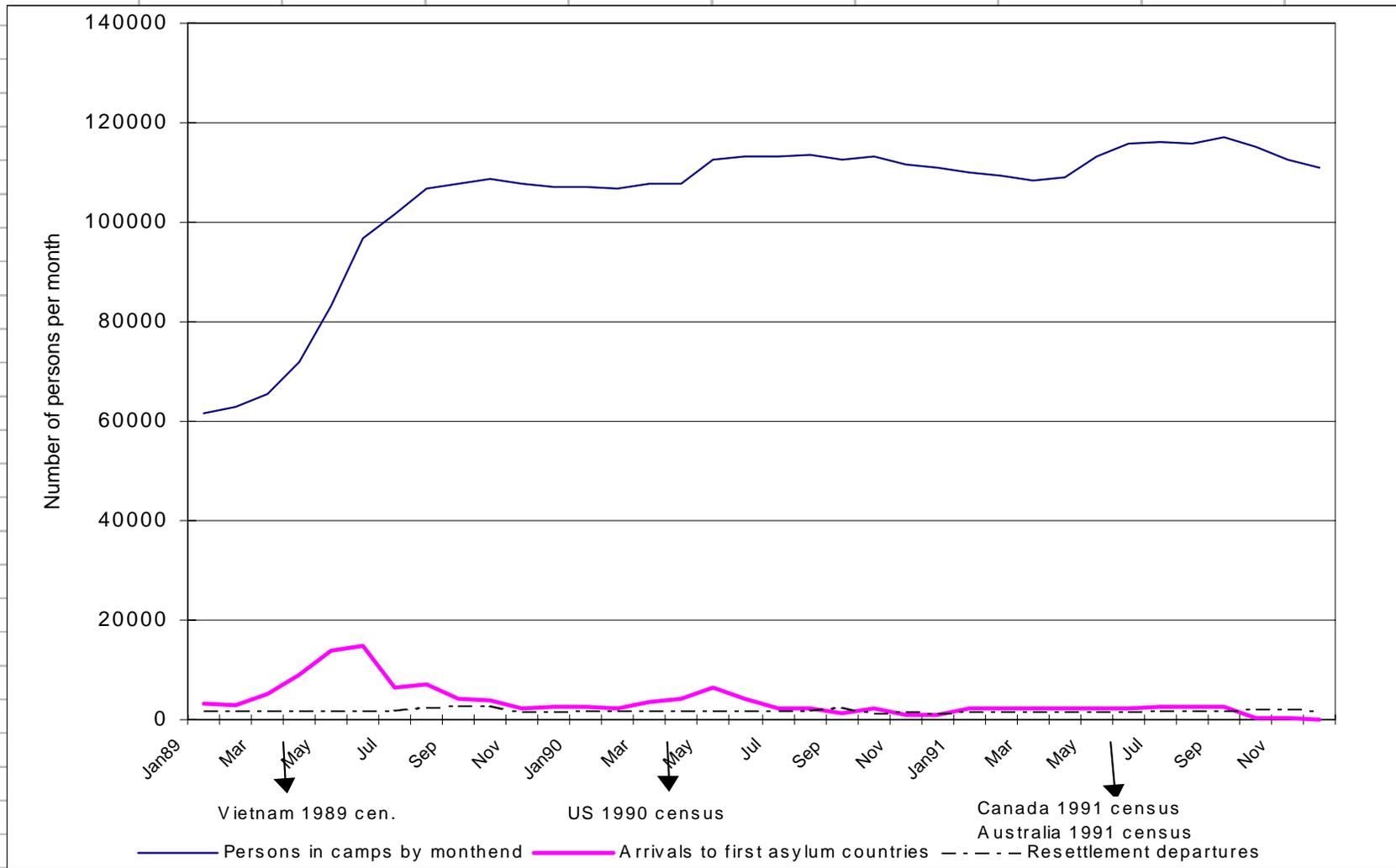
Figure 3. Vietnamese Refugee Movements. Boat People, July 1978 - December 1981



Sources:

UNHCR (1978, 1979, 1980, 1981)

Figure 4. Vietnamese Refugee Movements. Boat People, January 1989 - December 1991



Source: UNHCR (1989, 1990, 1991)

Country of arrival	Type of departure			Total
	Boat +Land	ODP		
Australia	14.70%	7.69%		11.62%
Canada	13.66	9.67		11.9
France	3.58	3.25		3.44
United States	56.26	72.89		63.57
Other (a)	11.8	6.5		9.47
Total	100.00%	100.00%		100.00%
(n)	(754,717)	(591,845)		(1,346,562)
<i>Note:</i>				
(a) The category "Other" includes various European countries, Japan, and New Zealand.				
<i>Source:</i>				
UNHCR (1995b)				

Table 2. Estimates of Vietnamese Net Migration, by Age Cohorts by Life-Table Survival Rate Method, 1979-1989

Age	Male	Female	Total
0-5	-314,461	-28,669	-343,130
5 to 10	-127,846	133,538	5,692
9.5-14.5	53,862	69,172	123,033
14.5-19.5	-439,876	-237,117	-676,993
19.5-24.5	-675,913	-201,349	-877,262
24.5-29.5	-127,806	5,875	-121,932
29.5-34.5	68,263	-33,934	34,329
34.5-39.5	-91,817	-131,338	-223,156
39.5-44.5	-65,559	-46,198	-111,757
44.5-49.5	-50,779	-10,061	-60,840
49.5-54.5	21,139	33,819	54,958
54.5-59.5	-10,756	5,013	-5,743
59.5-64.5	36,822	70,267	107,089
64.5-69.5	6,907	-34,418	-27,511
69.5-74.5	-30,262	-31,846	-62,108
74.5-79.5	-2,213	-23,498	-25,711
79.5-84.5	-8,019	-42,484	-50,503
84.5+	-1,773	-424	-2,197
Exits	-1,947,081	-821,336	-2,768,417
Entries	186,992	317,684	504,676
Total	-1,760,089	-503,652	-2,263,740
<i>Sources:</i>			

Table 3. Sex ratios and Cumulative Distribution by Age of Vietnamese-born Enumerated in the Censuses of the US, Canada and Australia, Who Immigrated to These Countries During the Intercensal Period, by Country of Immigration

UNITED STATES: April 1, 1980 - April 1, 1990					
Age in 1990	Male	Female	Sex ratio	Male cumulative percentage by age	Female cumulative percentage by age
0-4	2,066	2,219	0.93	0.012	0.014
5-9	6,274	5,437	1.15	0.047	0.049
10-14	16,278	14,614	1.11	0.139	0.142
15-19	26,245	19,265	1.36	0.287	0.266
20-24	22,981	17,476	1.31	0.416	0.377
25-34	46,750	37,281	1.25	0.680	0.616
35-44	30,014	30,688	0.98	0.849	0.812
45-54	14,013	14,418	0.97	0.928	0.904
55-64	6,962	7,578	0.92	0.967	0.952
65-74	3,415	4,319	0.79	0.986	0.980
75+	2,460	3,144	0.78	1.000	1.000
Total	177,459	156,439	1.13		
CANADA: June 3, 1981 - June 4, 1991					
Age in 1991	Male	Female	Sex ratio	Male cumulative percentage by age	Female cumulative percentage by age
0-4	489	441	1.11	0.013	0.012
5-9	1,995	1,848	1.08	0.067	0.062
10-25	14,752	12,814	1.15	0.466	0.411
25-29	4,932	4,427	1.11	0.600	0.531
30-34	4,366	5,025	0.87	0.718	0.668
35-39	3,187	3,883	0.82	0.804	0.774
40-44	2,036	2,277	0.89	0.859	0.836
45-54	1,896	2,043	0.93	0.911	0.891
55-64	1,786	2,258	0.79	0.959	0.953
65-69	604	714	0.85	0.975	0.972
70-74	465	493	0.94	0.988	0.985
75+	453	536	0.84	1.000	1.000
	36,961	36,760	1.01		
AUSTRALIA: June 30, 1981 - June 30, 1991					
Age in 1991	Male	Female	Sex ratio	Male cumulative percentage by age	Female cumulative percentage by age
0-4	489	441	1.11	0.011	0.011
5-9	1,995	1,848	1.08	0.058	0.057
10-14	4,592	4,206	1.09	0.165	0.162
15-19	4,868	4,322	1.13	0.279	0.269
20-24	5,884	4,658	1.26	0.416	0.385
25-34	12,021	10,618	1.13	0.697	0.649
35-44	6,713	6,785	0.99	0.854	0.818
45-54	2,380	2,560	0.93	0.909	0.882
55-64	2,165	2,659	0.81	0.960	0.948
65-74	1,231	1,467	0.84	0.989	0.985
75+	491	619	0.79	1.000	1.000
Total	42,828	40,183	1.07		
<i>Sources:</i>					

Table 4. Total Counts of Vietnamese Immigrants to Selected Resettlement Countries from Various Sources, 1980-1991

Source	Census (1) (a)	UNHCR (2) (b)	Percentage difference
	(1)	(2)	((2-1)/1)
UNITED STATES (April 1, 1980- April 1, 1990)	333,898	390,288	16.9
CANADA (June 3, 1981 - June 4, 1991)	73,721	72,552	-1.6
AUSTRALIA (June 30, 1981 - June 30, 1991)	83,011	88,565	6.7
TOTAL	407,619	462,840	13.5

Notes:

(1) Based on column 8 of Appendix Tables A3-A8.

(2) To make UNHCR counts comparable with census counts, UNHCR total counts of resettlement departures to the US, Australia, and Canada were discounted, for the US, by the number of resettlements during January-March 1989 and April-December 1990, for Australia, by the number of resettlements during January-June 1981 and July-December 1991, and for Canada by the number of resettlements during January-May 1981 and June-December 1991, because the survival procedures only account for those people who immigrated during the intercensal period. A monthly breakdown of UNHCR data on resettlement departures was available for most years relevant to these calculations (1980, 1981, 1990, and 1991) and for most types of resettlement departures (boat and land from refugee camps and ODP departures). Yet, for some years and types of departure, only semester counts were available. In this case, monthly counts were approximated as one sixth of semester counts.

Sources:

(a) Appendix Tables A3-A8

(b) UNHCR (1980, 1981, 1986, 1990, 1991, 1992)

Table 5. Total Vietnamese Arrivals to Refugee Camps in "First Asylum" Countries, and Direct ODP Departures to Countries of Resettlement During Vietnam's Intercensal Period (October 1, 1979 - April 1, 1989)

Year or month	Arrivals to refugee camps in first asylum countries		ODP departures	Total
	Boat people	Land people		
Oct 1979	2,854 (1)	218 (2)	330 (4)	3,402
Nov 1979	2,209 (1)	218 (2)	330 (4)	2,757
Dec 1979	2,745 (1)	218 (2)	330 (4)	3,293
1980	71,372 (2)	4262 (2)	4,706 (4)	80,340
1981	74,438 (2)	4942 (2)	9,815 (4)	89,195
1982	43,505 (2)	4133 (2)	10,057 (4)	57,695
1983	27,919 (2)	162 (2)	18,978 (4)	47,059
1984	24,761 (2)	1789 (2)	29,154 (4)	55,704
1985	22,115 (2)	91 (2)	24,940 (4)	47,146
1986	19,451 (2)	1921 (2)	18,418 (4)	39,790
1987	28,106 (2)	2126 (2)	12,961 (4)	43,193
1988	45,562 (2)	1473 (2)	21,275 (4)	68,310
Jan 1989	3,301 (3) (a)	(-)	3,483 (5)	6,784
Feb 1989	3,017 (3) (a)	(-)	3,483 (5)	6,500
Mar 1989	5,085 (3) (a)	(-)	3,483 (5)	8,568
Total	376,440	21553	161,743	559,736

Notes:

(a) Includes land people.

Sources:

(1) UNHCR (1979)

(2) UNHCR (1995b)

(3) UNHCR (1990)

(4) UNHCR (1990)

(5) UNHCR (1989)

Table 6. Probability of Dying of Vietnamese Immigrants to the US, Canada and Australia for 10-year Intercensal Periods.

	United States 1980-1990	Average of Canada and Australia 1981-1991
Male (all ages)	0.017455	0.015229
Female (all ages)	0.013351	0.010183

Source: Appendix Tables A3-A8

Table 7: Age Distribution of Vietnamese Emigrants Who Departed during Vietnam's Intercensal Period 1979-1989, by Sex

Age interval in 1990	Male	Female	Total	Male percentage by age	Female percentage by age
0-4	3,454	3,713	7,167	1.18	1.43
5-9	10,519	9,117	19,636	3.60	3.52
10-14	27,261	24,485	51,745	9.32	9.46
15-19	43,922	32,278	76,200	15.01	12.47
20-24	38,346	29,258	67,604	13.11	11.30
25-34	77,787	62,365	140,152	26.59	24.08
35-44	49,805	51,232	101,037	17.03	19.78
45-54	22,990	23,899	46,889	7.86	9.23
55-64	11,030	12,326	23,356	3.77	4.76
65-74	4,984	6,728	11,712	1.70	2.60
75+	2,426	3,551	5,977	0.83	1.37
Total	292,524	258,952	551,476	100.00	100.00

Source: Table 5

Table A1. Calculation of Estimates of Net Migration of Vietnamese Males, by Age Cohorts, by Life-Table Survival Rate Method, 1979-1989

Age in 1979	Age in 1989	1979 population (1)	1989 population (2)	9.5-year LT surv rates (3)	Forward method		Reverse method		Averaged net migration [(5)+(7)]/2=(8)
					Survivors (1)x(3)=(4)	Net migration (2)-(4)=(5)	"Younged" population (2)/(3)=(6)	Net migration (6)-(1)=(7)	
All ages	All ages	25580582	31629831		33366355	-1736524	33388840	-1783656	-1760090
Births, 1984-89(a)	0-5	5046137	4665461	0.98645	4977778	-312317	4729531	-316606	-314461
Births, 1979-84(b)	5 to 10	4545777	4393135	0.99447	4520627	-127492	4417576	-128201	-127846
Under 5	9.5-14.5	3946224	3895156	0.97359	3842015	53141	4000806	54582	53862
5-10	14.5-19.5	3928795	3425278	0.98283	3861345	-436067	3485110	-443685	-439876
10-15	19.5-24.5	3632555	2895916	0.98155	3565535	-669620	2950349	-682206	-675913
15-20	24.5-29.5	2954333	2762703	0.97791	2889082	-126379	2825100	-129233	-127806
20-25	29.5-34.5	2281171	2296698	0.97723	2229221	67477	2350221	69050	68263
25-30	34.5-39.5	1742277	1606504	0.97408	1697115	-90611	1649254	-93023	-91817
30-35	39.5-44.5	1177320	1070543	0.96397	1134899	-64356	1110558	-66762	-65559
35-40	44.5-49.5	966580	865004	0.94599	914373	-49370	914391	-52189	-50779
40-45	49.5-54.5	919291	868409	0.92258	848121	20288	941281	21990	21139
45-50	54.5-59.5	994602	884471	0.89951	894658	-10187	983277	-11325	-10756
50-55	59.5-64.5	825356	740916	0.85653	706940	33976	865023	39667	36822
55-60	64.5-69.5	680996	539475	0.78328	533408	6067	688742	7746	6907
60-65	69.5-74.5	540920	344979	0.68318	369545	-24566	504961	-35959	-30262
65-70	74.5-79.5	419164	223019	0.53574	224563	-1544	416282	-2882	-2213
70-75	79.5-84.5	284003	104829	0.38480	109285	-4457	272422	-11581	-8019
75+	84.5+	286995	47338	0.16671	47845	-507	283955	-3040	-1773

Notes:

(a) Equals three-fourths of the births in 1984 plus the births in 1985, 1986, 1987, 1988, and one-fourth of the births in 1989.

(b) Equals three-fourths of the births in 1979 plus the births in 1980, 1981, 1982, 1983, and one-fourth of the births in 1984.

Sources:

Vietnam General Statistical Office, 1983

Vietnam Central Census Steering Committee, 1994

Table A2. Calculation of Estimates of Net Migration of Vietnamese Females, by Age Cohorts, by Life-Table Survival Rate Method, 1979-1989

Age in 1979	Age in 1989	1979 population (1)	1989 population (2)	9.5-year LT surv rates (3)	Forward method		Reverse method		Averaged net migration [(5)+(7)]/2=(8)
					Survivors (1)x(3)=(4)	Net migration (2)-(4)=(5)	"Younged" population (2)/(3)=(6)	Net migration (6)-(1)=(7)	
All ages	All ages	27161184	33944235		34424439	-480203	35683060	-527099	-503651
Births 84/4-89/3	0-5	4760507	4665461	0.98601	4693928	-28467	4731636	-28870	-28669
Births 79/4-84/3	5 to 10	4288469	4393135	0.99337	4260041	133094	4422451	133982	133538
0-4	9.5-14.5	3766472	3719157	0.96936	3651061	68095	3836720	70248	69172
5-9	14.5-19.5	3761523	3460285	0.98239	3695295	-235011	3522300	-239223	-237117
10-14	19.5-24.5	3406774	3155524	0.98490	3355341	-199818	3203893	-202881	-201349
15-19	24.5-29.5	3060551	3017636	0.98407	3011809	5827	3066473	5922	5875
20-24	29.5-34.5	2601098	2526780	0.98437	2560447	-33667	2566896	-34202	-33934
25-29	34.5-39.5	1975507	1812367	0.98334	1942602	-130235	1843066	-132441	-131338
30-34	39.5-44.5	1314655	1240046	0.97800	1285730	-45684	1267943	-46712	-46198
35-39	44.5-49.5	1104086	1059655	0.96872	1069555	-9901	1093865	-10221	-10061
40-44	49.5-54.5	1084758	1069755	0.95570	1036702	33053	1119343	34585	33819
45-49	54.5-59.5	1113757	1045335	0.93422	1040492	4843	1118941	5184	5013
50-54	59.5-64.5	902407	881716	0.90317	815024	66692	976249	73842	70267
55-59	64.5-69.5	872541	722340	0.86444	754255	-31915	835621	-36920	-34418
60-64	69.5-74.5	663366	499405	0.79537	527620	-28216	627891	-35475	-31846
65-69	74.5-79.5	559727	362956	0.68251	382019	-19064	531795	-27932	-23498
70-74	79.5-84.5	434355	203578	0.53704	233265	-29687	379075	-55280	-42484
75+	84.5+	539607	109109	0.20247	109252	-143	538902	-705	-424

Notes:

(a) Equals three-fourths of the births in 1984 plus the births in 1985, 1986, 1987, 1988, and one-fourth of the births in 1989.

(b) Equals three-fourths of the births in 1979 plus the births in 1980, 1981, 1982, 1983, and one-fourth of the births in 1984.

Sources:

Vietnam General Statistical Office, 1983

Vietnam Central Census Steering Committee, 1994

Table A3. Calculation of Estimates of Net Immigration of Vietnamese-Born Males, by Age Cohorts, by Life-Table Survival Rate Method, for the United States: 1980-1990

Age in 1980	Age in 1990	Vietnam-born pop in US censuses		10-year LT surv rates (3)	Forward method Net		Reverse method "Younged" Net		Averaged net immigration [(5)+(7)]/(2)=(8)
		1980 (1)	1990 (2)		Survivors (1)x(3)=(4)	immigration (2)-(4)=(5)	population (2)/(3)=(6)	immigration (6)-(1)=(7)	
All ages	All ages	115554	285684		111323	166032	296099	180545	177459
-	0-4	-	2059	0.99681	-	-	2066	2066	2066 (a)
-	5-9	-	6270	0.99929	-	-	6274	6274	6274(a)
0-4	10-14	4988	21219	0.99640	4970	16249	21296	16308	16278
5-9	15-19	14896	41003	0.99509	14823	26180	41205	26309	26245
10-14	20-24	15444	38134	0.98923	15278	22856	38549	23105	22981
15-24	25-34	31518	77370	0.98370	31004	46366	78652	47134	46750
25-34	35-44	24877	54027	0.97843	24340	29687	55218	30341	30014
35-44	45-54	12104	25283	0.95669	11580	13703	26428	14324	14013
45-54	55-64	6952	12793	0.89450	6219	6574	14302	7350	6962
55-64	65-74	3175	5414	0.76959	2443	2971	7035	3860	3415
65+	75+	1600	2112	0.41622	666	1446	5074	3474	2460

Notes:

(a) Reverse survival only

Sources:

US Bureau of the Census (1988)

US Bureau of the Census (1993)

Table A4. Calculation of Estimates of Net Immigration of Vietnamese-Born Females, by Age Cohorts, by Life-Table Survival Rate Method, for the United States: 1980-1990

Age in 1980	Age in 1990	Vietnam-born pop in US censuses		10-year LT surv rates (3)	Forward method Net		Reverse method "Younged" Net		Averaged net immigration [(5)+(7)]/(2)=(8)
		1980 (1)	1990 (2)		Survivors (1)x(3)=(4)	immigration (2)-(4)=(5)	population (2)/(3)=(6)	immigration (6)-(1)=(7)	
All ages	All ages	106095	257578		103228	146703	264613	158518	156439
-	0-4	-	2213	0.99751	-	-	2219	2219	2219 (a)
-	5-9	-	5434	0.99947	-	-	5437	5437	5437 (a)
0-4	10-14	4577	19159	0.99732	4565	14594	19210	14633	14614
5-9	15-19	13487	32692	0.99742	13452	19240	32777	19290	19265
10-14	20-24	12094	29483	0.99581	12043	17440	29607	17513	17476
15-24	25-34	24125	61159	0.99423	23986	37173	61514	37389	37281
25-34	35-44	27197	57468	0.99021	26931	30537	58036	30839	30688
35-44	45-54	13033	26969	0.97629	12724	14245	27624	14591	14418
45-54	55-64	5734	12742	0.94090	5395	7347	13542	7808	7578
55-64	65-74	3242	6820	0.86659	2809	4011	7870	4628	4319
65+	75+	2606	3439	0.50744	1322	2117	6777	4171	3144

Notes:

(a) Reverse survival only

Sources:

US Bureau of the Census (1988)

US Bureau of the Census (1993)

Table A5. Calculation of Estimates of Net Immigration of Vietnamese Born Males, by Age Cohorts, by Life-Table Survival Rate Method, for Canada: 1981-1991

Age in 1981	Age in 1991	Vietnam-born pop in Canadian censuses		10-year LT surv rates (3)	Forward method		Reverse method		Averaged net immigration [(5)+(7)]/(2)=(8)
		1981 (1)	1991 (a) (2)		Survivors (1)x(3)=(4)	Net immigration (2)-(4)=(5)	"Younged" population (2)/(3)=(6)	Net immigration (6)-(1)=(7)	
All ages	All ages	28290	63968		27575	33911	65818	37528	36961
-	0-4	-	488	0.99762	-	-	489	489	489 (b)
-	5-9	-	1994	0.99934	-	-	1995	1995	1995 (b)
0-14	10-25	6990	21661	0.99436	6951	14710	21784	14794	14752
15-19	25-29	4135	8983	0.98729	4082	4901	9099	4964	4932
20-24	30-34	5795	10057	0.98695	5719	4338	10190	4395	4366
25-29	35-39	4500	7604	0.98643	4439	3165	7709	3209	3187
30-34	40-44	2440	4418	0.98319	2399	2019	4494	2054	2036
35-44	45-54	2475	4257	0.96689	2393	1864	4403	1928	1896
45-54	55-64	1210	2804	0.91062	1102	1702	3079	1869	1786
55-59	65-69	285	783	0.82807	236	547	946	661	604
60-64	70-74	185	533	0.74079	137	396	720	535	465
65+	75+	275	386	0.42343	116	270	912	637	453

Notes:

(a) The age distribution of Vietnamese-born persons enumerated in the 1991 census was reported in very wide age categories. It was redistributed within 5-year age groups according to the age distribution of Vietnamese born in Australia's 1991 census.

(b) Reverse survival only

Sources:

Statistics Canada (1984)

Statistics Canada (1994)

Table A6. Calculation of Estimates of Net Immigration of Vietnamese-Born Females, by Age Cohorts, by Life-Table Survival Rate Method for Canada: 1981-1991

Age in 1981	Age in 1991	Vietnam-born pop in Canadian censuses		10-year LT surv rates (3)	Forward method		Reverse method		Averaged net immigration male [(5)+(7)]/(2)=(8)
		1981 (1)	1991 (a) (2)		Survivors (1)x(3)=(4)	Net immigration (2)-(4)=(5)	"Younged" population (2)/(3)=(6)	Net immigration (6)-(1)=(7)	
All ages	All ages	22420	58358		21976	34095	59557	37137	36760
	0-4	-	440	0.99806	-	-	441	441	441 (b)
	5-9	-	1847	0.99954	-	-	1848	1848	1848 (b)
0-14	10-25	6130	18909	0.99720	6113	12796	18962	12832	12814
15-19	25-29	2645	7052	0.99583	2634	4418	7082	4437	4427
20-24	30-34	3555	8552	0.99532	3538	5014	8592	5037	5025
25-29	35-39	3800	7648	0.99391	3777	3871	7695	3895	3883
30-34	40-44	2100	4348	0.99108	2081	2267	4387	2287	2277
35-44	45-54	2090	4072	0.98045	2049	2023	4153	2063	2043
45-54	55-64	1065	3215	0.95134	1013	2202	3379	2314	2258
55-59	65-69	380	1025	0.90895	345	680	1128	748	714
60-64	70-74	245	667	0.86015	211	456	775	530	493
65+	75+	410	583	0.52324	215	368	1114	704	536

Notes:

(a) The age distribution of Vietnamese-born persons enumerated in the 1991 census was reported in very wide age categories. It was redistributed within 5-year age groups according to the age distribution of Vietnamese born in Australia's 1991 census.

(b) Reverse survival only

Sources:

Statistics Canada (1984)

Statistics Canada (1994)

Table A7. Calculation of Estimates of Net Immigration of Vietnamese-Born Males, by Age Cohorts, by Life-Table Survival Rate
Method for Australia: 1981-1991

Age in 1981	Age in 1991	Vietnam-born pop in Aus censuses		10-year LT surv rates (3)	Forward method Net Survivors (1)x(3)=(4)		Reverse method "Younged" population (2)/(3)=(6)		Averaged net immigration [(5)+(7)]/(2)=(8)
		1981 (1)	1991 (2)		immigration (2)-(4)=(5)	Net immigration (6)-(1)=(7)			
All ages	All ages	22266	63968		21786	39700	65739	43473	42828
-	0-4	-	488	0.99695	-	-	489	489	489(a)
-	5-9	-	1994	0.99926	-	-	1995	1995	1995(a)
0-4	10-14	1333	5913	0.99665	1329	4584	5933	4600	4592
5-9	15-19	2803	7646	0.99531	2790	4856	7682	4879	4868
10-14	20-24	2272	8102	0.98966	2249	5853	8187	5915	5884
15-19	25-29	3089	8983	0.98571	3045	5938	9113	6024	5981
20-24	30-34	4116	10057	0.98619	4059	5998	10198	6082	6040
25-29	35-39	3361	7604	0.98698	3317	4287	7704	4343	4315
30-34	40-44	2071	4418	0.98459	2039	2379	4487	2416	2398
35-39	45-49	1209	2524	0.97668	1181	1343	2584	1375	1359
40-44	50-54	763	1733	0.96054	733	1000	1804	1041	1021
45-49	55-59	448	1374	0.93208	418	956	1474	1026	991
50-54	60-64	368	1430	0.88724	327	1103	1612	1244	1174
55-59	65-69	186	783	0.82234	153	630	952	766	698
60-64	70-74	113	533	0.73109	83	450	729	616	533
65-69	75-79	70	246	0.60714	42	204	405	335	269
70-74	80-84	41	110	0.45393	19	91	242	201	146
75+	85+	23	30	0.20367	5	25	147	124	75

Notes:

(a) Reverse survival only

Sources:

Australian Bureau of Statistics (1984)

Australian Bureau of Statistics (1995)

Table A8. Calculation of Estimates of Net Immigration of Vietnamese-Born Females, by Age Cohorts, by Life-Table Survival Rate
Method for Australia: 1991-1991

Age in 1981	Age in 1991	Vietnam-born pop in Aus censuses		10-year LT surv rates (3)	Forward method Net Survivors (1)x(3)=(4)		Reverse method "Younged" population (2)/(3)=(6)		Averaged net immigration [(5)+(7)]/(2)=(8)
		1981 (1)	1991 (2)		immigration (2)-(4)=(5)	Net immigration (6)-(1)=(7)			
All ages	All ages	18831	58358		18580	37491	59417	40586	40183
-	0-4	-	440	0.99759	-	-	441	441	441(a)
-	5-9	-	1847	0.99950	-	-	1848	1848	1848(a)
0-4	10-14	1234	5432	0.99760	1231	4201	5445	4211	4206
5-9	15-19	2662	6973	0.99774	2656	4317	6989	4327	4322
10-14	20-24	1862	6504	0.99616	1855	4649	6529	4667	4658
15-19	25-29	1988	7052	0.99491	1978	5074	7088	5100	5087
20-24	30-34	3053	8552	0.99461	3037	5515	8598	5545	5530
25-29	35-39	3313	7648	0.99385	3293	4355	7695	4382	4369
30-34	40-44	1959	4348	0.99148	1942	2406	4385	2426	2416
35-39	45-49	976	2197	0.98606	962	1235	2228	1252	1243
40-44	50-54	588	1875	0.97614	574	1301	1921	1333	1317
45-49	55-59	367	1683	0.96127	353	1330	1751	1384	1357
50-54	60-64	287	1532	0.94003	270	1262	1630	1343	1302
55-59	65-69	188	1025	0.90792	171	854	1129	941	898
60-64	70-74	167	667	0.85296	142	525	782	615	570
65-69	75-79	87	354	0.76254	66	288	464	377	332
70-74	80-84	62	159	0.62767	39	120	253	191	156
75+	85+	38	70	0.29122	11	59	240	202	131

Notes:

(a) Reverse survival only

Sources:

Australian Bureau of Statistics (1984)

Australian Bureau of Statistics (1995)

FOOTNOTES

1 This paper is a revised version of a chapter of my doctoral dissertation. I am grateful to Samuel Preston for his suggestions on various versions of this paper, and to Irma Elo, Charles Hirschman and Avery Guest for helpful comments.

2 This figure does not include some 130,000 Vietnamese who had been closely associated with the US or the Thieu administration, and were evacuated by boat or by air by US military forces in the last few days prior to the capture of Saigon by North-Vietnamese forces (Viviani, 1984; Hitchcox, 1990). The figure also does not include about 260,000 ethnic Chinese who crossed the border to China's Guangxi province in 1978 (UNHCR, 1979; Alley, 1980). Adding these numbers to the UNHCR count of refugees would yield a grand total of 1,790,000 emigrants from Vietnam during period from 1975 to 1995.

3 This estimates relies on the number of arrivals in camps of first asylum countries, and should be considered as a minimum estimate, as arrivals to refugee camps differ from departures from Vietnam by an unknown proportion lost at sea. Estimates of losses reported in various studies range from 40,000 to 150,000 (Hitchcox, 1990), and from 10 to 50 percent of arrivals (Viviani, 1984).

4 The number of such departures was far smaller than the large numbers who took the maritime route.

5 By mid 1979, the flow of arrivals of Vietnamese refugees to camps in Southeast Asian countries and Hong Kong was inflated by Cambodian and Laotian refugees seeking a safe haven in Thailand. The former were fleeing Vietnamese invading troops and starvation precipitated by a shattered economy (Viviani, 1984:34). The latter, mostly Hmong and other hill-tribe groups, were fleeing political persecution because of their resistance against the Vietnamese-backed Laotian government (Robinson 1991:222-223).

6 These life tables are based on deaths in the household in the year prior to the census adjusted upward for incompleteness of death reporting using the Preston-Coale method. They have life expectancy at birth of 63 for males and 67.5 for females, with an implied level of overall mortality similar to the 1979 census (Vietnam General Statistical Office, 1991:105).

7 For computational convenience, the number of person-years lived by those born in the intercensal period are computed for exact ages 0-5 and 5-10 rather than 0-4.75 and 4.75-9.5. Thus the estimates of migration for these age groups will cover full 5-year periods from April 1, 1984 to March 31, 1989, and from April 1, 1979 to March 31, 1984. Migration is more likely to be concentrated in young adult ages than at the youngest ages, and this will not result in a significant loss of precision of the estimates.

8 1.25 year reflects the fact that the population under 5 years of age in 1989 has been at risk for only 1.25 years on the average, or 2.5×0.5 – the first factor representing the average period of time between birth and the 1989 census, and the second factor indicating the fact that emigration occurred during the period between birth and the 1989 census, with an assumed average residence in the area of one-half the period (Shryock and Siegel, 1976:360).

9 The only information on fertility in the intercensal period is available from the 1989 census report. The authors of the report estimated average annual birth rates for selected periods by reverse survival method based on the age-sex structure of the 1989 population. They derived average crude birth rates of 33.5 per 1,000 for the period 1980-1984 and 31 per 1,000 for the period 1985-1989 (General Statistical Office, 1991:95). To obtain an annualized count of births, I applied these rates to the 1979 and 1989 census total populations respectively. I further assumed that 1/12 of births in a year occur in each month. This allowed to estimate the number of births occurring in the period between April 1, 1979 and March 31 1984 as three fourths of 1979 births plus births in 1980, 1981, 1982, 1983 and one fourth of the births in 1984, and the number of births occurring between April 1, 1984 and March 31, 1989 as three fourths of the births in 1984 plus the births in 1985, 1986, 1987, 1988 and one fourth of the births in 1989. I then applied the “normal” sex ratio at birth of 106 males per 100 females to the total estimated number of births occurring in the two periods to derive an estimate of the number of male and female births.

10 The term "immigration" is not an accurate description of the legal status of all Vietnamese persons arriving to the US, Canada and Australia. It is used here for clarity of exposition, because it suggests the final destination of the emigration flow from Vietnam. Vietnamese may arrive to the country of final destination as refugees or immigrants, although both categories are considered residents of these countries by census rules, and are enumerated by the census (Warren and Passel, 1987; Samuel, White and Perrault, 1987; Australia Bureau of Immigration and Population Research, 1994). For example, in the US, *immigrants* are persons admitted with permanent residence alien status (Gordon, 1987), while *refugees* physically enter the US under the Migration and Refugee Assistance Act long before they become eligible to change their status from refugee to immigrant (Barringer, Gardner and Levin, 1993). Vietnamese spouses and children of American citizens usually enter as *immigrants*. But, over the course of the 1980s, there has been an increasing trend of Vietnamese *immigration* to the US, because many *immigrants*, who would otherwise have been refugees, were sponsored by relatives already living in the US who had arrived with the first refugee flow of 1975-1976 (Gordon, 1987; Hitchcox, 1990).

11 Here, forward projection allows to obtain an estimate of net immigration M , or the number of Vietnam-born persons who immigrated to the US in the intercensal period and survived to the end of the period. Backward projection yields an estimate of net immigration MN , that combines the number of Vietnamese-born persons who immigrated during the intercensal

period and survived to the end of the period and those who died during the period. It also incorporates an estimate of children age a and younger born in Vietnam and immigrated to the country of resettlement during the intercensal period (United Nations, 1970:26). The average of the two estimates MO will include the number of deaths to the migrant cohorts with the implicit assumption that deaths and migration are evenly distributed over the intercensal period or that all migration occurs in the middle of the period. Thus, the ratio M/MO represents the probability that Vietnamese-born persons who immigrated to the country of resettlement during the intercensal period will survive to the end of the period. Its complement $1 - M/MO$, or the probability of dying, will be employed in one of the next sections to construct a single factor that discounts the volume of emigration from Vietnam by the proportion dying in the country of resettlement.

12 Vietnamese refugees who reached Thailand by land are not included in these counts. UNHCR data do not provide a monthly breakdown of land refugees by country of origin, namely Vietnam, Cambodia and Laos. Separate counts by year for earlier periods have only recently become available. Fortunately, Vietnamese “land” people represent only a small fraction of total departures from Vietnam, with the bulk of land refugees consisting of Cambodians and Laotians.

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