SURVEYING MIGRANT HOUSEHOLDS: A COMPARISON OF CENSUS-BASED, SNOWBALL, AND INTERCEPT SURVEYS[#]

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Abstract

Few representative surveys of households of migrants exist, limiting our ability to study the effects of international migration on sending families. We report the results of an experiment designed to compare the performance of three alternative survey methods in collecting data from Japanese-Brazilian families of potential migrants to Japan. The three surveys conducted were 1) Households selected randomly from a door-to-door listing using the Brazilian Census to select census blocks; 2) A snowball survey using Nikkei community groups to select the seeds; and 3) An intercept survey collected at Nikkei community gatherings, ethnic grocery stores, sports clubs, and other locations where family members of migrants are likely to congregate. We analyze how closely well-designed snowball and intercept surveys can approach the much more expensive census-based method in terms of giving information on the characteristics of migrants, the level of remittances received, and the incidence of return migration.

PRELIMINARY, PLEASE DO NOT CITE

RESULTS CURRENTLY ARE PROVIDED USING ONLY A SUBSET OF THE DATA

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1. Introduction

The importance of international migration for development has received increasing attention from the research and policy communities (e.g. GCIM, 2005; World Bank 2005), leading to a High-Level Dialogue on International Migration and Development at the United Nations General Assembly in September 2006.[1] The focus of much of this research and discussion has been on examining the impacts of international migration on development in the sending countries, and in identifying policies which can maximize the development benefits of migration. However, very few detailed and representative surveys of households of migrants exist, limiting our ability to study the effects of international migration on sending families.

Public use microdata from national censuses provide representative information, but only for a very limited set of variables. Nationally representative household surveys, such as the World Bank's Living Standards Measurement Surveys provide more information about living standards, education, and other outcomes of interest, but usually relatively little information on the migration process. As a result, answering many questions of interest in the study of migration requires specialized surveys. However, most of these specialized surveys are non-probability samples of unknown representativeness, making it hard to generalize any conclusions reached from them. As Fawcett and Arnold (1987) note, common approaches used by many studies are to choose their samples from individuals who belong to church groups, social organizations, or other defined groups; use snowball samples of individuals referred by friends or acquaintances; and/or to focus exclusively on areas of high out-migration.

This paper reports on the results of an experiment designed to compare the performance of three methodologies for sampling households with migrants: i) a stratified sample using the census to randomly sample census tracts, in which each household is then listed, and screened to determine whether or not it has a migrant, with the full length questionnaire then being applied in a second phase only to the households of interest; ii) a snowball survey in which households are asked to provide referrals to other households with migrant members; and iii) an intercept survey (or time and space sampling survey), in which individuals are sampled during set time periods at a pre-specified set of locations where households in the target group are likely to congregate.

We apply these methods in the context of a survey of Brazilians of Japanese descent (Nikkei). There are approximately 1.2-1.9 million Nikkei amongst Brazil's 170 million population. Many of these Nikkei have migrated to Japan to work after a Japanese law change in 1990 allowed third-generation Nikkei unrestricted access to Japanese labor markets (Tsuda, 1999, Higuchi, 2006). The estimated 265,000 migrants send approximately $US2 billion in annual remittances (Beltrão and Sugahara, 2006). We compare the performance of the three different survey methods in collecting data from Nikkei households in Brazil with and without migrants in Japan.

[1] http://www.un.org/esa/population/hldmigration/ [accessed February 10, 2007].

Whilst our application involves surveying Nikkei households (an ethnic minority), with and without migrants abroad, the methodologies employed are equally applicable to attempts to survey migrants in their destination countries. More generally, the problem of surveying migrant households is one of surveying "rare elements" (Kish, 1965, Kalton and Anderson, 1986). The results of the survey experiment are therefore also informative for surveys of other rare populations, such as ethnic minorities and the homeless.

The remainder of the paper is structured as follows. Section 2 outlines the different methodologies which have been developed and used in previous studies to survey migrants and their families. Section 3 describes our experiment and the Brazilian setting, while Section 4 describes how the different methodologies were applied in practice. Section 5 compares the results of the three survey methods, and Section 6 provides a cost comparison across the different methods. Section 7 concludes.

2. Different Methods Used for Sampling Migrants, Families of Migrants, and Other Rare Elements

Any attempt to carry out a specialized survey of migrants or of migrant-sending households must face the problem that international migration is a relatively rare event in most countries. Bilsborrow et al. (1997) note that in three-quarters of the countries in the world, the proportion of international migrants was at most 6.5 percent in the early 1990s. Even in countries in which international migration is more common, finding a household with a migrant currently abroad or a recently returned migrant can be a rare event. Therefore carrying out a survey of migrant-sending households is essentially a problem of surveying "rare elements" or "rare populations" (Kish, 1965, Kalton and Anderson, 1986). Our application fits well this description: it is estimated that there are approximately 1.4 million Nikkei households in Brazil, relative to an overall population of over 170 million.

Conducting a probabilistic sample of a rare population presents no problem if a full sample frame is available. Representative samples of legal migrants have thus been recently conducted using administrative records on new immigrants. Examples include the New Immigrant Survey (NIS) in the United States, the Longitudinal Survey of Immigrants to Australia (LSIA) and the Longitudinal Immigration Survey (LISNZ) in New Zealand. This is more difficult to carry out for migrant-sending households, as it requires obtaining from migrants and migrant records contact details for their remaining household. The only application we are aware of which does this is the Pacific Island-New Zealand Migration Survey (McKenzie, Gibson and Stillman, 2006), which links new Tongan migrants in New Zealand to their remaining households in Tonga, and surveys the sending households in Tonga.

The much more common situation is one in which no survey frame is available. Three approaches to sampling rare elements have then been most commonly used in practice to survey migrant-sending households or migrants.[2] These are stratified sampling using

[2] Note that surveys of households with migrants will also want to include some households without migrants for comparison purposes. In many circumstances these households are not rare elements, and a

disproportionate sampling fractions with two-phase sampling; snowball sampling; and time and space sampling, also known as intercept sampling, location sampling, or aggregation point sampling.[3] We discuss each in turn.

The use of stratified sampling with disproportionate sampling fractions is the approach recommended by Bilsborrow et al. (1997) in their guidelines for improving international migration statistics. They note that most countries have population census data or population registers which can be used to estimate populations and the numbers of international migrants. They therefore recommend using the census to select provinces, districts, and if possible, census sectors, with probability proportional to the number of households with migrants. After census sectors are selected, a two-phase sampling strategy can be used, in which a screening phase is first carried out to identify the respondents of special interest, and then the full questionnaire is administered in a second phase to a sample of households identified in the first phase.

In theory, this approach has the advantage of providing a representative sample of households with and without migrants. It has been used in the NIDI/Eurostat surveys in Egypt, Ghana, Morocco, Senegal and Turkey. In most of these applications, surveying is first restricted to certain provinces or districts where migrants are though to come from, in order to reduce survey costs. For example in Ghana the survey chose 17 electoral districts, and screened 21,504 households according to household migration status, in order to arrive at a target sample of 1,980 households. 1571 households were then interviewed in the second phase (Groenewold and Bilsborrow, 2004). The disadvantage of this method is that it can be expensive and time-consuming to screen a large number of households in order to identify households with migrants. Fawcett and Arnold (1987) note also that non-response can be a major problem in immigration surveys, particularly in urban areas. They point out that while individuals usually have a legal obligation to answer questions in the census, surveys generally carry no legal sanctions for refusal to respond. In addition, in urban areas, immigrants who work often work long hours, making it difficult to find them at home, while undocumented immigrants may be reluctant to take part in a survey for fear of being found by government authorities.

A second method commonly used to sample rare populations is the chain-referral method, in which an initial sample of individuals is taken, and each of these is asked to provide referrals to other individuals in the population of interest. Snowball sampling (Goodman, 1961) and respondent-driven sampling (Heckathorn, 1997) are the most common examples. In snowball sampling, each individual in the sample is asked to name *k* different individuals, and each of these is then asked to name *k* different individuals, and so on. Snowball sampling has been used by the Mexican Migration Project to sample permanent Mexican migrants in the United States (Massey and Singer, 1987), and was

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sufficient number of such households will be identified using the methods described here to find the rare elements. In our context, it is Nikkei households, both with and without migrants, that are the rare elements.

[3] Other sampling strategies which have been used have been convenience sampling, and identifying migrants through surnames in the telephone book. For example, Osili (2006) used the Chicago phone directory and identified names of the Igbo of South Eastern Nigeria to sample Nigerian migrants in the U.S.

used in part by the NIDI/Eurostat survey to survey immigrants in Spain (Groenewold and Bilsborrow, 2004).

A necessary condition for successful application of snowballing is that members of a rare population know each other (Kalton and Anderson, 1986). Such an approach is likely to hold for ethnic minorities, making it appropriate for sampling migrants at destination, and in our case, sampling a rare ethnic group in Brazil. Moreover, recent work by Heckathorn (1997, 2002) has shown that it is possible to obtain a representative sample through chain referral methods, based on the idea of "six degrees of separation", in which each person in a population is linked to each other person through six intermediaries on average. However, applying this in practice requires that the chain referrals be long, and that adjustments are made for the fact that subjects with larger personal networks are more likely to be oversampled. Other problems which can arise in practice is that the subjects may not refer friends in order to protect their privacy, and that contact information is frequently inadequate, so attrition rates can be high.

The third method used to sample immigrants or ethnic minorities makes use of the fact that immigrants often cluster at certain locations. Simple examples of this type of sampling carried out sampling at only one type of location. Examples include surveying Mexicans at border crossing points in the Encuesta sobre Migración en la Frontera Norte (EMIF) (Bustamente et al., 1997), and surveying Latina immigrant women at churches in the U.S. (Wasserman et al. 2005). However, by sampling at only one type of location, the survey is likely to miss many migrants. Better coverage of the population of interest can be achieved by surveying at multiple locations. An issue which arises here is that individuals can potentially be surveyed more than once, so the survey needs to account for multiple selection possibilities during analysis.

Sampling theory for multiple location samples are provided in Kalsbeek (1986) and Kalton (1991, 2001). The basic survey design involves sampling in both space and time. Primary sampling units are constructed as combinations of locations and time segments where surveying will take place at the location. Then some form of systematic sample is employed to select individuals visiting the location during the specified time period. Such an approach has been used to survey other rare populations, such as visitors to soup kitchens, African nomadic populations by surveying at watering holes, and homosexual men, by surveying at bars, dance clubs and street locations. Blangiardo (1993, cited in Groenewold and Bilsborrow, 2004) proposes a similar methodology for sampling migrants, which was used in the NIDI/Eurostat survey of Ghanaian and Egyptian immigrants in Italy. A listing of popular places, called aggregation points, where migrants tend to meet (such as mosques, health care facilities, telephone calling centers, shelters, and public squares) is made. At each location migrants surveyed are asked how often they visited any of the other aggregation points, allowing *ex-post* selection probabilities to be calculated for each individual surveyed.

Intercepting migrants or rare elements in public places provides a cost-efficient method of surveying, and may allow surveying of individuals who are seldom found in their homes. By ex-post weighting of the sample, one can obtain a sample representative of

any person in the reference group who has visited at least one of the locations during the sample period. This method is appealing in that it is likely to offer a sample which is more representative of the underlying population of interest than can be found through the first few referral chains of a snowball sample, with less time and cost than a census-based screening and listing exercise. However, a disadvantage of interviewing in public locations is that individuals will generally have less time to answer the survey than during a home visit. As a result, on location surveys of this type will have to use a much shorter questionnaire, thereby collecting less extensive data on the population of interest.[4]

3. The Experiment

Each of the three main methods of sampling migrants or migrant-sending households has its theoretical advantages and disadvantages in terms of cost, time, coverage, and representativeness. However, comparing the practical performance of the three methods is made difficult by the fact that they have all been used in different country contexts, at different times, with different questionnaires and survey teams. Nevertheless, knowing how the different methods perform in practice is a question of large importance for the design of new surveys of migrants or migrant-sending households. We therefore designed an experiment to compare how the three main methods perform in practice. In particular, we compare a census-based stratified random sample, an intercept survey, and a snowball survey.

The context of our experiment is a survey that the World Bank was requested to perform of the Japanese-Brazilian population (Nikkeis) in Brazil. Japanese migration to Brazil began in 1908 with a ship carrying bonded labor to the coffee plantations (Goto, 2006). High rates of migration from Japan to Brazil occurred from 1925-36 as the Japanese government subsidized emigration, and again from 1955-1961 as the Japanese government again promoted emigration during post-war rebuilding. Many of these workers settled in Brazil, and the population of Japanese descent in Brazil was estimated to have reached 1.2 million by 1987-88 (Tsuda, 2003). Following a revision of Japanese immigration law in 1990, many of these Nikkei began migrating back to Japan to work: In 2004 there were 190,000-265,000 Brazilians in Japan, who were estimated to be sending US$2 billion in remittances back to Brazil (Beltrão and Sugahara, 2006).

The survey was designed to provide detail on the characteristics of households with and without migrants, estimate the proportion of households receiving remittances and with migrants in Japan, and examine the consequences of migration and remittances on the sending households. We compare the performance of the three different survey methods in meeting these objectives. The same questionnaire was used for the stratified random sample and snowball surveys, and a shorter version of the questionnaire was used for the intercept surveys. Therefore we can directly compare answers to the same questions across survey methodologies, and determine the extent to which the intercept and

[4] In some circumstances one may be able to use the intercept location survey to construct a sampling frame of migrants along with contact details, and subsequently follow-up with longer questionnaires at home or in another location. However, it appears likely that many people approached on the street will refuse to provide follow-up contact details, particularly if they are concerned about crime, or are of illegal migration status.

snowball surveys are able to give similar results to the more expensive census-based survey, and test for the presence of the types of biases one might expect. For example, we would expect individuals who belong to Nikkei community organizations to have a greater connection to Japan, and therefore to be more likely to migrate. Nikkei who are more educated and integrated into Brazilian society may be harder to observe through snowball and intercept surveys. We will compare across the three surveys the characteristics of migrant sending households, the likelihood of receiving remittances and level of remittances received, and the incidence of return migration.

Several characteristics of the Nikkei population in Brazil present a challenge for surveying. Firstly, the population is predominantly urban, with many living in high-rise apartments secured by building managers or doormen. With crime a general concern in urban Brazil, some building managers are reluctant to allow entry into apartment buildings. Moreover, as is common in urban areas, most individuals work outside of their homes, and many are reluctant to be interpreted at home outside of working hours. Secondly, the Nikkei population in Brazil share the characteristic of many ethnic minorities and migrant groups of being suspicious of outsiders. Furthermore, there have been incidences of Nikkei returning from working in Japan being targeted for crime. These characteristics are shared by many other migrant groups of interest, such as undocumented migrants and migrants from other urban areas, making this case study an application similar to many other practical applications of interest. In common with common practice in surveys of migrants elsewhere, we made an effort to gain the trust and support of the local community. This was done through communications with Nikkei associations, collaboration with the representatives of *Sudameris* who deal with the Nikkei community, and the use, where possible, of Nikkei interviewers.

4. Implementation of the Three Sampling Methods

This section discusses in detail how the stratified random sample survey, intercept survey, and snowball survey were implemented. All three surveys were implemented by the same survey firm, *Sensus Data World*, an experienced Brazilian survey firm, and were carried out at the same point in time, allowing comparability between the three methods. The same questionnaire was used for both the stratified random sample and snowball surveys, while a much shorter questionnaire with a subset of the questions was used for the intercept survey.

4.1 Stratified Random Sample of Nikkei Households in Sao Paulo and Parana

Brazil's population in the 2000 Census was 169.8 million. However, it is estimated that 80 percent of the Nikkei population lives in just two states: 54 percent in the state of Sao Paulo (population 37.0 million), and 26 percent in Parana state (population 9.6 million).[5] We therefore decided to only survey these two states, which combined have a population approaching 50 million people. The sampling process then consisted of three stages. First, a stratified random sample of 75 census tracts was selected. Second, interviewers carried out a door-to-door listing within each census tract in order to determine which

[5] Population numbers from the 2000 Census are taken from http://www.ibge.gov.br/english/estatistica/populacao/censo2000/ [accessed February 8, 2007].

households had a Nikkei member. Third, the survey questionnaire was then administered to households identified as Nikkei. We now describe the details of each step.

Selection of Census Tracts[6]

The 2000 Brazilian Census was used to classify households as Nikkei or non-Nikkei. The Brazilian Census does not ask ethnicity, but instead asks questions on race, country of birth, and whether an individual has lived elsewhere in the last 10 years. Based on these questions, a household is classified as (potentially) Nikkei if it has any of the following:

a) A member born in Japan
b) A member who is of yellow race, and who has lived in Japan in the last 10 years.
c) A member who is of yellow race, who was not born in a country other than Japan (predominantly Korea, Taiwan or China), and who did not live in a foreign country other than Japan in the last 10 years.

This procedure provides an approximate estimate of the number of Nikkei households, but will tend to be an overstatement due to misclassifying as Nikkei households comprising of individuals of Korean, Taiwanese or Chinese ethnicity who were all born in Brazil and hadn't been in those countries in the last 10 years.[7]

Table 1 tabulates the number of yellow race immigrants in Brazil in the 1980, 1991 and 2000 Censuses by country of birth. Individuals born in Japan are the second largest immigrant group in Brazil after the Portuguese, accounting for 11 percent of all immigrants in 2000. The number born in Japan has been falling over the last twenty-five years. In 2000, Japanese-born still accounted for 74 percent of all yellow race immigrants, Chinese 11 percent, Koreans 9 percent, and Taiwanese 5 percent. We classify as non-Nikkei yellow race individuals born in other countries, so our concern is with second or latter generation non-Nikkei Asians. If these generations occur in the same proportions as first generation, this would suggest we are overestimating the number of Nikkei by at most 35 percent. However, as Table 1 shows, Japanese were a greater share of yellow race immigrants in the 1980 and 1991 Censuses. This is illustrated further in Figure 1, which uses the 2000 Census to plot the mean year of arrival in Japan and mean age of selected yellow race foreign-born. The mean year of arrival is much earlier for Japanese than other races, meaning that a larger proportion of their ethnicity should be second or later generation. Thus our overstatement from misclassifying on race should be considerably less than 35 percent.

The 2000 Census was then used to estimate the number of Nikkei in each municipality, área de ponderação, and census tract. An área de ponderação (AP) is the smallest geographical unit used for public reporting of the results of the Census, and consists of a grouping of census tracts. There are 1913 APs in Sao Paulo state and 596 in Parana state. A second source of estimation error occurs from the fact that questions on race, birthplace, and migration are only asked on the long form of the Census questionnaire, which is applied to only 10 percent of households in municipalities with more than

[6] IBGE statisticians Kaizô Beltrão and Sonoe Pinheiro carried out the selection of the sample in consultation with the authors.

[7] We will also misclassify as non-Nikkei Nikkei individuals who are married to Chinese or Koreans. Intermarriage is very low between Japanese and other Asian groups, so this will not induce much error.

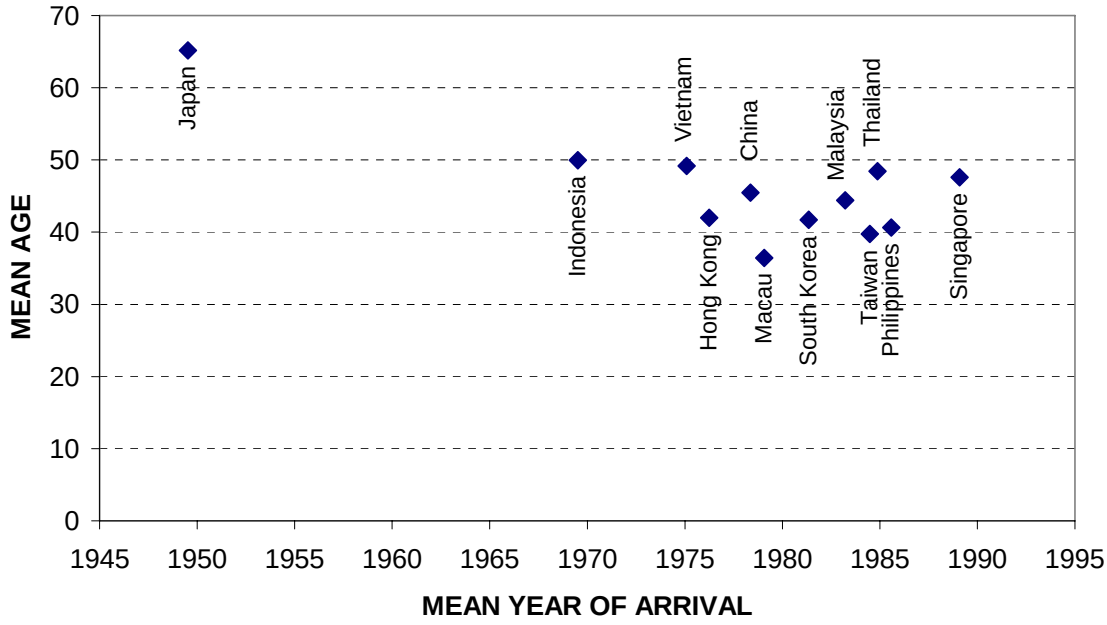
15,000 inhabitants, and to 20 percent of households in municipalities with less than 15,000. Therefore an additional source of prediction error arises from this sampling. This sampling error will be small at the level of a municipality and AP, but will be greater at the level of the census tract.

Table 1: Yellow Race Immigrants in Brazil

	Number of foreign-born by country of birth			Shares in 2000 Census	
Country of Birth	1980	1991	2000	Percent of all immigrants	Percent of Yellow Race
Japan	139480	85572	70932	10.37	73.9
China	8799	8324	10301	1.51	10.7
South Korea	7258	8528	8578	1.25	8.9
Taiwan	2414	2737	4536	0.66	4.7
Indonesia			693	0.10	0.72
Hong Kong			376	0.05	0.39
Philippines			360	0.05	0.38
North Korea			66	0.01	0.07
Malaysia			60	0.009	0.06
Macau			27	0.004	0.03

Source: 1980, 1991 and 2000 Brazilian Census

FIGURE 1: MEAN YEAR OF ARRIVAL IN BRAZIL AND MEAN AGE AMONG YELLOW RACE FOREIGN-BORN IN BRAZIL (2000 CENSUS)



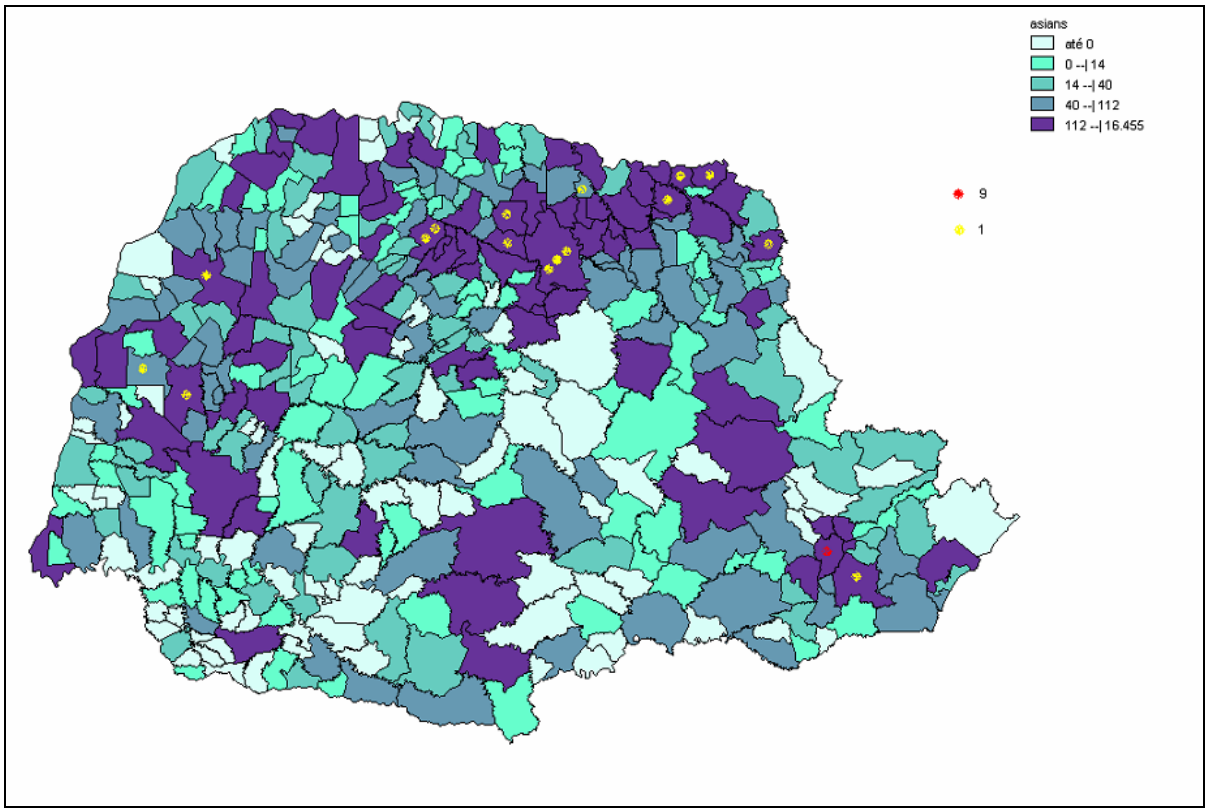
Source: 2000 Brazilian Census

These Nikkei estimates were then used to select 50 census tracts in Sao Paulo state and 25 census tracts in Parana state as follows. First, municipalities were randomly selected according to probability proportional to size (PPS) sampling with replacement, where

size is the number of Nikkei households. Secondly, within each municipality selected, APs were sampled with PPS. Then finally, census tracts were sampled with PPS within the APs. In order to ensure coverage of both census tracts with high concentrations of Nikkei, and lower concentrations, we stratified so that in Sao Paulo, 30 out of the 50 census tracts were selected from among census tracts estimated to have 15 or more Nikkei households living in them, and 20 census tracts were estimated to have 4-15 Nikkei households living in them. In Parana, 15 out of the 25 census tracts were chosen from those with 15 or more Nikkei households, and the remaining 10 census tracts chosen from those with 4-15 Nikkei households. We did not include census tracts with 3 or fewer estimated Nikkei, as they are estimated to cover only 1 to 3 percent of the Nikkei population in the two states, and listing such census tracts would increase the survey cost with little additional increase in sample.

Figure 2 graphically illustrates the census tracts selected in Parana state. Municipalities are shaded according to the estimated number of Nikkei, with darker shading indicating more Nikkei. The map shows the spatial concentration of Nikkei in certain regions of the state. Nine of the 25 census tracts selected are in one municipality, Curitiba, the state capital with population 1.6 million. The other 16 census tracts are spread over 13 other municipalities, and cover also a couple of municipalities with less than 112 estimated Nikkei households.

Figure 2 – Distribution of Asians (excluding Chinese, Korean and Taiwanese Nationals) by municipality and census tracts in the sample (dots) – Paraná - 2000



Source: Map prepared by Kaizô Beltrão and Sonoe Pinheiro using 2000 Census data.

Listing

Prior to the commencement of the listing operation, letters were sent to approximately 150 Nikkei associations with bases in the areas chosen, explaining the purpose of the survey, asking them to encourage their members to answer the survey, and providing a telephone number for any enquiries. A door-to-door listing exercise of the 75 census tracts was then carried out between 20 October 2006 and 14 November 2006. A census tract averaged 301 housing units. Interviewers went to each housing unit with a screening questionnaire, which asked whether or not the household had any members who were Nikkei, or Nikkei members currently in Japan. Households with Nikkei were then asked whether they had members who had returned from Japan, whether they had members currently in Japan, and the whether they had any members who were third or fourth generation Japanese. Three attempts were made to interview the household in the event that the first or second attempt yielded nobody at home. In the event that an interview could not be made due to refusal, no one at home, or the refusal of apartment building management to allow the survey, the Nikkei status of households was obtained through proxy-reporting from a neighbor or building manager.

Table 2 summarizes the results of the listing process. The listing covered 14,239 dwelling units in Sao Paulo state and 8,300 units in Parana state, for a total of 22,539 dwellings. This was 21 percent more dwelling units than recorded for these census tracts in the 2000 Census, showing the extent of population growth and new construction over the six years since the Census. Among these 22,539 the listing detected 839 Nikkei households, 528 of which were interviewed in person, and 311 obtained by proxy-reporting. Proxy-reporting was more common in Sao Paulo state, particularly in Sao Paulo city, where household members were harder to find at home. Thus 3.7 percent of the dwelling units listed contained Nikkeis.

The census tracts listed show a great deal of variation in the number of Nikkei. The mean size of a census tract was 301 households. The mean (median) number of Nikkei households in a census tract was 11 (8). Fifty-nine of the 75 census tracts each had less than 15 Nikkei, including three census tracts with no Nikkei households (with 758 households between them). Two census tracts had more than 50 Nikkei households, one with 58 and the other with 92.

TABLE 2: LISTING OF HOUSEHOLDS IN SAO PAULO AND PARANA STATES

	Sao Paulo State	Sao Paulo City	Parana State	Curitiba City	Combined Sample
Number of Municipios surveyed	28	1	14	1	42
Number of Census tracts surveyed	50	16	25	9	75
Average Size of Census tract	285	314	332	381	301
Number of residential units listed	14239	5025	8300	3425	22539
Number of nikkei households listed	559	206	280	78	839
Number of nikkei where household member interviewed	305	86	223	58	528
Percent of household listed that are nikkei	3.9	4.1	3.4	2.3	3.7
Percentage of nikkei households where:					
Interview obtained	54.6	41.8	79.6	74.4	62.9
Interview refused	18.3	13.6	7.5	18.0	14.7
Family was travelling	2.7	1.5	1.1	0.0	2.2
No one was home during three visits	24.5	43.2	11.8	7.7	20.3
Number of households in 2000 Census	11886	3902	6698	2294	18584
Predicted number of Nikkei households in 2000 Census	1209	395	532	215	1741
Listed households/Census households	1.20	1.29	1.24	1.49	1.21
Listed Nikkei/Census predicted Nikkei	0.46	0.52	0.53	0.36	0.48

The bottom of Table 2 shows that the number of Nikkei listed was only 48 percent of the number of Nikkei predicted on the basis of the 2000 Census, despite the overall number of households growing 21 percent. There are three main reasons for this difference. First, part of the difference reflects the misclassification of Chinese, Korean and Taiwanese households as Nikkei in predicting the number of Nikkei in the Census. Secondly, given that six years had passed between the Census and our survey, the difference could also partly reflect population dispersion, if Nikkei households are moving out of the more traditional neighborhoods over time. Finally, part of the difference could also be due to the long form of the Census being used only for 10 percent of households, and thus to sampling error in predicting the number of Nikkei in a census tract from the 10 percent sample.

Administration of the Household Survey

Once a list of Nikkei households had been obtained, the final stage of the survey carried out an in-person survey of Nikkei households. Our initial budget planned on surveying 900 households, and so we intended to carry out a stratified sample of the Nikkei households obtained through the listing exercise. However, since only 839 Nikkei households were obtained via listing, all listed Nikkei households were selected for the full survey. Fieldwork began in late November 2006, and all dwellings were visited at least once by December 22, 2006. During this initial wave of surveying we were successful in interviewing 247 Nikkei households, 109 in Sao Paulo state and 138 in Parana. An additional 70 households visited said that they had no Nikkei members. Most of these were identified as Nikkei by proxy-reporting during the listing phase, and therefore were falsely identified. This therefore reduces the target number of Nikkei households to 769, of which the 247 interviewed represents 32 percent. The interview rate is 43 percent of households where a household member answered the screening interview.

The households which were not able to be interviewed during this initial phase were households where no one was home at the time of the survey visit, where the building manager refused access to the building, or where the household refused to answer the survey. A second wave of surveying began January 18, 2007, intended to increase the number of households responding. We made a number of changes to the survey protocol in order to attempt to get a response from households not interviewed in the first wave:

a) Meetings were held with the presidents of several of the most important Nikkei associations in Sao Paulo city and Curitiba to ask for their direct support. The contacted associations agreed to do this, and provided phone numbers and names which could be used in a letter presented by the interviewer, so that the interview subject could call with any questions about the veracity of the survey. Similarly, additional local contact details were provided for the World Bank, which could again be used by interview subjects to verify the survey was legitimate.
b) The initial round of interviewing used Brazilian interviewers who were not Nikkei, due to difficulties hiring Nikkei who were interested in carrying out survey work. More intensive efforts were undertaken to find Nikkei workers, allowing Nikkei field workers to be used in this second wave.
c) Prizes were used to try and increase the incentive to participate. Interview subjects were told that a random drawing would be done amongst completed interviews, with the winners receiving Video IPods.
d) Finally, if subjects still refused to answer the questionnaire, interviewers would leave a much shorter version of the questionnaire to be completed by the household by themselves, and later picked up. This shorter questionnaire was the same as used in the Intercept survey, taking 7 minutes on average. The intention with the shorter survey was to provide some data on households that would not answer the full survey due to time constraints, or to them being reluctant to have an interviewer in their house.

This strategy has been very successful in increasing our response rate and sample size. As of the time of writing, we are waiting for the final data from this second round collection. However, the survey manager has indicated that they managed to collect an additional 153 surveys in this second phase: 43 more with the long survey, and 110 using the shorter survey.

4.2 The Intercept Survey in Sao Paulo

The Intercept survey was designed to carry out interviews at a range of locations frequented by the Nikkei population in the city of Sao Paulo. We designed a short version of the questionnaire to apply at these locations. The questionnaire was four pages in length, consisted of 62 questions, and took a mean time of 7 minutes to answer. All interviewing took place between December 9, 2006 and December 20, 2006.

Consultations with Nikkei community organizations, local researchers, and officers of *Sudameris*, which provides remittance services to this community, were used to select a broad range of locations. We chose 9 fixed point locations and 6 events. The 9 fixed locations are: a sports club, a metro station in the Liberdade neighborhood, two *Feiras* (Sunday open markets), a hospital focused on the Nikkei community, two grocery stores specializing in Japanese foods, a Japanese cultural society which offers language classes and evening events, and outside a branch of the Banco Sudameris in the Saúde

neighborhood. The 6 events were: an afternoon Japanese film event organized by the Sociedade Brasileira de Cultura Japonesa, a large cultural festival with music, dancing and *taiko*-drumming organized by ACAL (Associação Comercial e Assistencial da Liberdade), a Japanese food festival organized by ACESA (Associação Cultural Esportiva de Santana), a Japanese art exposition organized by Fundação Mokiti Okada, a Christmas concert organized by Coral do Bunkyo, Paineiras e Silver Boys, and a music festival organized by Grupo The Friends.

Interviewers were assigned to visit each location during pre-specified blocks of time. Two field-workers were assigned to each location. One fieldworker carried out the interviews, while the other carried out a count of the number of people with Nikkei appearance who appeared to be 18 years or older who passed by each location. For the fixed places, this count was made throughout the pre-specified time block. For example, between 2:30pm and 3:30pm at the sports club, the interviewer counted 57 adult Nikkeis. Refusal rates were carefully recorded, along with the sex and approximate age of the person refusing. A note was made of the number of individuals who were asked to answer the questionnaire because they appeared Nikkei, but who replied they were not Nikkei. The proportion of falsely identified Nikkei was used to adjust the count taken by the fieldworker to obtain an estimate of the number of Nikkei passing the intercept location.

In the case of intercept surveys carried out at events, a possible concern was that the same person might circle past the location multiple times, thereby invalidating the count. Therefore the fieldworker instead counted the total number of individuals passing during a 10-minute period, and the number of Nikkei adults passing during this period. Estimates of the total number attending the event were obtained from the event organizers, and adjusted by the sample proportion observed to be adult Nikkei to get an estimate of the number of adult Nikkei attending the event.

Table 3 lists the sample size collected, number of refusals, time spent sampling, and approximate number of Nikkei at each sampling location. A target of 34 completed interviews was set for each location, in order to make sure the sample wasn't too heavily concentrated in only one or two very popular locations. In practice slightly more interviews were taken in several locations, while only 4 interviews were completed at the art exposition. In all, 516 intercept interviews were collected, along with 325 refusals. The average refusal rate is thus 39 percent, with location-specific refusal rates ranging from only 3 percent at the food festival to almost 66 percent at one of the two grocery stores. The last column of the Table shows that the total number of Nikkei visiting the 15 locations during the sampling period was almost 14,000.

Although 11 out of the 15 locations were in two Nikkei neighborhoods: Liberdade and Saúde, only 18 percent of the sample lived in these neighborhoods, with individuals traveling into events, and to work, shop, or visit friends.[8] In fact, individuals reported living in over 150 distinct neighborhoods, with a few living outside of Sao Paulo state.

[8] 19.8 percent of the individuals interviewed in intercept locations in Liberdade and Saúde were from these two neighborhoods.

Table 3: Sao Paulo Intercept Survey: December 9-20, 2006

Intercept Point	Number of interviews	Number of refusals	Refusal rate (%)	Time spent in location	Approximate number in location
Fixed point locations					
Coopercotia Atlético Clube	34	23	40.4	8.5 hours	368
Estação Metrô São Joaquim	49	37	43.0	14 hours	1436
Feira da Liberdade	34	3	8.1	5 hours	1282
Feira Livre da Rua Carneiro	34	3	8.1	7 hours	1635
Hospital Santa Cruz	42	12	22.2	8 hours	374
Mercearia Marukai	54	76	58.5	13 hours	2583
Mercearia Satsuyama	36	69	65.7	11 hours	1922
Sociedad Brasileira de Cultura Japonesa-Bunkyo	34	25	42.4	9 hours	311
Agencia Sudameris	34	24	41.4	8 hours	186
Events					
Cinema Bunkyo	34	19	35.8		97
ACAL Toyo Matsuri - Festival Oriental	30	22	42.3		824
ACESA Motitsuki Matsuri (Festival Gastronômico)	29	1	3.3		424
Fundação Mokiti Okada -Exposição de Obras de Arte	4	2	33.3		67
Coral Bunkyo - Concerto de Natal	34	3	8.1		704
Grupo the Friends-Koohaku Utagassen 2006 (Festival musical)	34	6	15.0		1731
	516	325	38.6		13944

At each location, individuals were asked whether or not they had visited any of the other fixed point locations during the past two weeks, and whether they had attended or were planning on attending the six events. Only 19 percent of individuals had visited only their location, and on average individuals had visited 3.18 of the 15 locations during the two week period specified. 12 percent of individuals had visited 6 or more of the locations, with one individual going to 13 out of the 15.

Table 4 examines the characteristics of individuals who visit more locations amongst those sampled. Column 1 carries out a parsimonious OLS regression, of the number of locations as a function of gender, age, marital status, education level, employment status, and two key variables of interest for comparing across surveys: whether or not the individual has ever worked or studied in Japan, and whether or not their household receives remittances from Japan. We see that females and older individuals visit more locations. More importantly, we see that return migrants visit more locations. Column 2 then adds additional controls for generation, whether or not a household member reads Japanese newspapers, and for whether or not employed individuals refuse to give a range for income. As we would expect, individuals who are more connected to Japan, by virtue of being first or second generation Japanese, and being in households where Japanese newspapers are read, are found in more locations. Additionally, we see that individuals who refuse to give their income range are found in less locations. Similar results are seen in columns 3 and 4, which use a negative binomial model, to account for the fact that the number of locations visited is a count variable.

Table 4: Which individuals go to more intercept locations?
Dependent variable: Number of locations visited in past 2 weeks

	(1)	(2)	(3)	(4)
	OLS	OLS	Negative Binomial	Negative Binomial
Male	-0.288*	-0.294*	-0.0913*	-0.0902*
	(0.17)	(0.17)	(0.053)	(0.052)
Age	0.0151***	0.00719	0.00467***	0.00229
	(0.0052)	(0.0061)	(0.0016)	(0.0019)
Married	0.101	0.0965	0.0349	0.0324
	(0.18)	(0.18)	(0.056)	(0.055)
Has University Education	0.00686	0.0842	0.00622	0.0338
	(0.18)	(0.18)	(0.056)	(0.056)
Has worked/studied in Japan	0.614***	0.313	0.193***	0.0983*
	(0.18)	(0.19)	(0.055)	(0.060)
Works for Pay	0.0787	0.125	0.0310	0.0439
	(0.19)	(0.19)	(0.060)	(0.059)
Receives Remittances	0.436	0.433	0.119	0.119
	(0.29)	(0.28)	(0.083)	(0.081)
Issei		0.485		0.148
		(0.34)		(0.099)
Nissei		0.433**		0.145**
		(0.21)		(0.067)
Reads Japanese newspapers		0.688***		0.210***
		(0.20)		(0.059)
Refuses to give income range		-1.005***		-0.377***
		(0.34)		(0.12)
Constant	2.209***	2.173***	0.837***	0.811***
	(0.32)	(0.32)	(0.10)	(0.10)
Observations	492	491	492	491
R-squared	0.07	0.13		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

These results show that individuals who are more strongly linked to the Nikkei community have higher likelihoods of being sampled in the intercept survey. Therefore, to obtain a sample which is representative of anyone who visits any of the different intercept locations, we need to place less weight on individuals who are more likely to be found. In particular, the probability that individual *i* is sampled is proportional to:

$$p_i = \min\left\{1, \sum_{j=1}^{15} \Pr(i \text{ visits } j) * \textit{Fraction of individuals sampled at } j\right\} \qquad (1)$$

Where *j* denote the 15 intercept locations.[9] We then weight the sample by the inverse of the probability that each individual was sampled.

[9] No individuals were interviewed more than once, but 16 out of the 516 individuals interviewed had predicted probabilities of being located of greater than 1, hence the need for imposing the minimum condition in equation (1).

Table 5 compares the sample means for different variables for the unweighted and weighted intercept sample. Since men were less likely to be sampled, weighting the sample causes the sample proportion of males to increase from 50 percent to 58 percent. We see that weighting also reduces the estimate of the proportion of individuals with strong linkages to Japan. According to the unweighted sample, we would estimate that 45 percent of individuals had ever worked or lived in Japan, compared to 35 percent in the weighted sample. Similarly, weighting reduces our estimate of the proportion of Nikkei living in households where someone reads Japanese newspapers, listens to Japanese radio, watches Japanese television programs, or checks Japanese websites. Weighting the sample makes less difference to our estimate of the proportion of households receiving remittances: it falls from 10.3 percent to 9.7 percent. However, since individuals who refuse to answer monetary questions receive higher weight, our estimate of the proportion of individuals receiving remittances who refuse to say how much they receive increases from 73 percent to 82 percent.

The weighted sample is then representative of anyone who visited any of the different intercept locations *and agreed to answer the survey*. As noted, the refusal rate was 38 percent. The gender and approximate age of individuals refusing was collected by our interviewers, enabling us to examine the extent to which refusal varies by these characteristics. Refusal rates for males and females were not statistically different: the refusal rate was 37.1 percent for males and 40.0 percent for females, with a t-test for equality having a p-value of 0.37. In contrast, refusal rates do appear to vary by age, being lower for individuals over 50. The refusal rate is 44.4 percent for individuals 30 or under, 47.0 percent for individuals 31-49, and 27.5 percent for individuals 50 and over. There is no statistically significant difference in refusal rates between 30 and under and 31-49 year olds, but both groups have refusal rates higher than individuals 50 and over at with $p<0.001$. Since it is likely that the characteristics of young Nikkei who refuse to answer the survey differ from those who agree to answer the survey, we do not attempt to reweight the data to adjust for refusals.

Table 5: Comparison of Means of Unweighted and Weighted Intercept Sample
Sao Paulo City Intercept Survey

	Unweighted Intercept	Weighted Intercept
Proportion Male	0.50	0.58
Age	46.6	51.6
Proportion Married	0.48	0.43
Proportion with Nikkei Spouse if Married	0.82	0.78
Proportion with some University education	0.58	0.59
Proportion working for pay	0.67	0.69
Proportion refusing to give range for income if working	0.07	0.17
Household Size	3.29	3.46
Proportion Issei	0.15	0.12
Proportion Nissei	0.47	0.45
Proportion Sansei	0.36	0.42
Proportion Yonsei	0.02	0.02
Proportion who ever studied/worked in Japan	0.45	0.35
Proportion of households with member ever in Japan	0.65	0.59
Proportion with household member currently in Japan	0.35	0.33
Proportion with household member who..		
Reads Japanese/Nikkei newspapers	0.39	0.28
Listens to Japanese/Nikkei radio programs	0.25	0.21
Watches Japanese/Nikkei TV programs	0.43	0.36
Reads Japanese/Nikkei books/magazines	0.42	0.31
Reads newspapers from Nikkei associations	0.39	0.28
Checks Japanese/Nikkei websites on the internet	0.24	0.17
Proportion who receive remittances from Japan	0.103	0.097
Proportion who refuse to answer whether they receive remittances	0.019	0.025
Amount of Remittances received if receive and report	381.4	258.3
Proportion of individuals receiving remittances who refuse amount	0.73	0.82

4.3 The Snowball Survey in Sao Paulo State

The final type of survey method trialed was that of a snowball survey. The questionnaire used was the same as used for the stratified random sample. Our plan was to begin with a seed list of 75 households, and to aim to reach a total sample of 300 households through referrals from the initial seed households. Each household surveyed was asked to supply the names of three contacts: (i) a Nikkei household with a member currently in Japan; (ii) a Nikkei household with a member who has returned from Japan; and (iii) a Nikkei household without members in Japan and where individuals had not returned from Japan. They were also asked to say the number of households they knew in each category, which could then be used to weight the sample.

The first step was therefore to select the seed households. One approach likely to be followed by researchers attempting a snowball survey is to use ethnic organizations as the source of the seed households. To replicate what a reasonable researcher might do, we therefore decided to use Nikkei associations to obtain the seed households. In collaboration with Sudameris, we therefore contacted 25 associations throughout the state

of Sao Paulo, who had prior associations with Sudameris. The purpose of the survey was explained to each association, and each was asked to supply the names and contact details of three members who we could interview. Twenty of the 25 associations agreed to participate, supplying 67 seed names to us (several gave more than 3 names). The associations were asked to inform their members about the survey and obtain their consent. However, many of the individuals appear not to have been informed.

The snowball survey began in December 2006, and experienced two main problems. The first was that some of the households supplied as seeds by the Nikkei associations refused to answer the survey. The second problem was that among households interviewed, most households did not wish to provide referrals to other Nikkei associations. They noted that the length and content of the questionnaire made them reluctant to give the names of friends who could answer it.

In response to these problems, a second phase of the snowballing survey began in January 2007. More associations were contacted to provide additional seed names, and a shorter version of the questionnaire was developed to help reduce refusal rates.

5. Preliminary Results

Please note that the results here are preliminary, based on only a subset of the data from the stratified random sample and snowball surveys. Moreover, an intercept survey is also being carried out in Curitba, Parana. Results will be updated following the completion of collection of the data at the end of March, 2007. Tests of significance in the differences discussed here will also be carried out then.

We expect that the snowball and intercept surveys will oversample individuals which are more connected to Japan and to the Nikkei community in Brazil. This should be especially the case for the seed households in the snowball survey, who are all members of Nikkei associations. As discussed above, weighting the intercept survey households helps correct for the oversampling of individuals who attend more community events and locations, and therefore should bring the intercept survey results closer to the stratified survey. We therefore wish to test the following hypotheses:

H1: The intercept and snowball households sampled will be more closely connected to the Nikkei community than randomly sampled Nikkei households.
H2: weighting the intercept survey will bring the sample closer to the random sample.
H3: the snowball and intercept surveys will overstate the proportion of households with migrant experience, due to oversampling households with more links to Japan.
H4: the intercept and snowball samples will over-sample *issei* (first-generation Nikkei) who will be more strongly connected to Japan, and under-sample *yonsei* (fourth generation Nikkei), who are likely to be more integrated into Brazil and less likely to attend community events or belong to community associations.
H5: Refusal rates for questions about remittances will be higher for the intercept survey, since they take place in a public location.

Table 6 presents some preliminary results using the full intercept data from Sao Paulo, data from the first wave of the stratified sampling in Sao Paulo and Parana, and data from the first 28 seed households interviewed for the snowball survey. Comparing the different samples, we see strong evidence in support of the first hypothesis. Household members in the intercept and snowball samples are much more likely to read Nikkei newspapers, watch Nikkei TV programs and visit Japanese/Nikkei websites than households in the stratified sample. For example, 43 percent of the snowball sample read Japanese newspapers, compared to 39 percent in the intercept sample, and 10 percent in the stratified sample.

Table 6: Preliminary Comparison of Key Variables Across Different Sampling Methods

	Unweighted Intercept	**Weighted Intercept**	**Stratified Sample** Sao Paulo	Parana	Combined	**Snowball Sample**
Proportion of adults 18 and over who are:						
Proportion Issei	0.149	0.120	0.099	0.072	0.083	0.145
Proportion Nissei	0.471	0.448	0.547	0.426	0.475	0.542
Proportion Sansei	0.359	0.416	0.307	0.458	0.397	0.277
Proportion Yonsei	0.019	0.017	0.047	0.043	0.045	0.036
Proportion of households with member who:						
Ever studied/worked in Japan	0.45	0.35	0.23	0.32	0.28	0.43
Ever in Japan	0.65	0.59	0.33	0.51	0.43	0.93
Is currently in Japan	0.35	0.33	0.15	0.22	0.19	0.36
Reads Japanese/Nikkei newspapers	0.39	0.28	0.09	0.10	0.10	0.43
Listens to Japanese/Nikkei radio programs	0.25	0.21	0.07	0.09	0.08	0.21
Watches Japanese/Nikkei TV programs	0.43	0.36	0.15	0.27	0.21	0.43
Reads Japanese/Nikkei books/magazines	0.42	0.31	0.11	0.15	0.13	0.43
Reads newspapers from Nikkei associations	0.39	0.28	0.06	0.10	0.08	0.54
Checks Japanese/Nikkei websites on the internet	0.24	0.17	0.04	0.09	0.06	0.21
Proportion of households which:						
Receive remittances from Japan	0.103	0.097	0.174	0.109	0.138	0.179
Refuse to answer whether they receive remittances	0.019	0.025	0.018	0.058	0.040	0.036
Report receipt, but refuse to say amount received	0.731	0.818	0.410	0.550	0.490	
Amount of remittances received for those reporting	381.4	258.3	10875	3571	7223	
Sample Size	516	516	109	138	247	28

Secondly, in accordance with the second hypothesis, we see that weighting the intercept sample does bring it closer to the stratified sample, in terms of links to the Nikkei community, and in terms of migration levels. Thirdly, and of crucial importance for migration studies, we do find that the proportion of households with migration experience is overstated in the intercept and snowball surveys relative to the stratified sample. 93 percent of households in the snowball seed sample have had a household member visit Japan, compared to 65 percent of the intercept sample (59 percent after weighting), and 43 percent in the stratified sample. The intercept and snowball samples have approximately one-third of households with a member currently in Japan, compared to one-fifth of households in the stratified sample.

Despite these large differences in migration rates, the proportion of households receiving remittances from Japan is reasonably similar across the different surveys. As a result, the intercept and snowball surveys will underestimate the proportion of households with a migrant which receive remittances. However, in accordance with the fifth hypothesis, the proportion of those receiving remittances who refuse to report how much they receive is

higher in the intercept survey (73-82 percent) than in the stratified sample (41-55 percent).

There is also some support for the fourth hypothesis. The proportion of adults 18 and over who are *Issei* in the intercept and snowball surveys is twice that in the stratified sample, while the intercept survey has only 1.7 percent of adults as *yonsei*, compared to 4.5 percent in the stratified sample. The snowball survey seed households have 3.6 percent of their adult members as *yonsei.*

6. Comparison of the Costs of the Different Methods

Breakdown of Cost and Time data to come from Sensus

7. Conclusions

Conclusions to be written when full results available.

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