Modern Hawaiian Migration: Brain Drain or Brain Gain?

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Discussion of the Hawaiian brain drain ebbs and flows in the public discourse. However, few statistical analyses have investigated the phenomenon. Using Census 2000 data, I classify Native Hawaiians into migrant statuses: islanders, lifelong residents of Hawai'i; departees, those who left for the continent; returnees, those who returned to Hawai'i by 2000; and continentals, lifelong residents of the continent. I perform analyses to determine whether Hawaiians in different migrant statuses are more likely to have higher levels of educations, income, and home ownership than islanders. Results suggest an educational brain drain and a home ownership brain gain. No significant effects exist for incomes. These ambiguous findings suggest that Hawaiian migration may be a dynamic part of broader life-course trajectories.

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An editorial in the *Honolulu Advertiser* on 8 August 2003 renewed a call-to-arms for the people of Hawai'i to stem the "flood of out-migration" from the islands to greater economic opportunities in the continental United States. The writer pointed to Census 2000 statistics on migration between 1995 and 2000, which show that fewer people moved to Hawai'i in that time period than those who moved away: 125,000 and 201,000, respectively, resulting in a net loss of 76,000 residents (Creamer, 2003).

Such is a recurring concern in the state of Hawai'i, popping up during political campaigns, economic fluctuations, and cultural gatherings (Manis, 1999). In 1999, the *Honolulu Star-Bulletin* devoted a series of articles as well as a dedicated editorial section to the phenomenon, seeking to gather and disseminate as much information as possible about the causes and consequences of out-migration from the state (Leong, 1999).

Migration theorists have documented several prominent causes for the movement of people from one location to another (and often back again). Neoclassical theorists posit that greater potential wage income in a destination than in the origin will prompt migration (Todaro, 1969) or that imbalances in labor and capital will result in shifts of people and inputs (Lewis, 1954). Further, the new economics of migration (Stark & Bloom, 1985; Stark & Levhari, 1982; Stark & Taylor, 1989) suggests that migrants seek to minimize risk by situating themselves in strategically and economically beneficial locations to better ensure their households. Both sets of theories can easily be applied to the modern movement of Native Hawaiians from the islands of Hawai'i to the continental United States.

The issue of community and cultural loss is not unique to Hawai'i and is faced by metropolitan areas such as Pittsburgh (Hansen, Ban, & Huggins, 2003), to countries such as Turkey (Tansel & Gungor, 2003) and India (Parthasarathi, 2002), and to entire regions such as Latin America (Pellegrino, 2001). However, few commentators or researchers have examined the issue in relation to specific ethnic or cultural groups. For example, are Hawaiians departing the state at the same rates as the general population? And what do we know about return migration? Do Hawaiians leave the islands to satisfy educational, economic, and personal goals but return upon their successful completion?

Return to the Backbone

For Hawaiian migrants, the cultural and spiritual implications of migration are uniquely conveyed in the Hawaiian expression, *Hoʻi hou i ka iwi kuamoʻo*, which translates to "return to the backbone," meaning to return to one's roots, homeland, and family. Consequently, out-migration from the islands among Hawaiians takes on considerable significance. Hawaiian cultural values place great significance on *ʻohana* (family), *ʻāina* (land), and *moʻokūʻauhau* (genealogy), concepts arguably overlooked in broader American society. (See Kanaʻiaupuni in this volume.)

The commitment of Hawaiians to family—families-of-origin, extended families, and families-of-choice—defines the concept of ʻohana and permeates many facets of life on the islands. Such strong familial ties, if greater than those of other cultural groups, can significantly influence the probability of migration among Hawaiians in relation to others. Geographic separation from loved ones poses emotional burdens for would-be migrants and represents an absence of social support in potential destinations, often resulting in resistance to migration decisions among Hawaiians.

Chances of migration can also be affected by the bond many Hawaiians feel toward the ʻāina. A substantial number of Hawaiian proverbs and sayings reference the reverence for the islands, their resources, their beauty, and the balance shared between the people and the land. Owing to the importance of the land, sea, and air in the Hawaiian archipelago, the connection to one's homeland is significant and can greatly influence decisions to remain or to move elsewhere.

Finally, the strong affiliation and homage paid to Hawaiian ancestors through genealogy provides yet another bond between Hawaiians and the state of Hawaiʻi. The connection to familial roots among Hawaiians is expressed in the ongoing tradition of reciting portions of their genealogy during formal introductions. This traditional practice is supported and reinforced in the Native Hawaiian environment, where access to Hawaiian language speakers, knowledgeable *kūpuna* (elders), and extended family permits exchanges of family history.

Operating in opposition to these ties to the state are the economic and social forces that push people to the continent. The constricted labor market within the state suppresses wages, limits the number of job opportunities, and reduces the potential for job growth. Further, the tight finance market, limited housing stock, and exorbitant construction costs impede the establishment of homes. These

economic obstacles are complemented by social factors that can lure Hawaiians to the continent, namely broader educational opportunities and marriage markets. Hawaiians seeking diverse educational opportunities may travel to the continent. Once there, however, economic opportunities or personal relationships, such as a new spouse, can influence their intentions to return.

Hypotheses

Unfortunately, cross-sectional datasets such as the decennial censuses can do little to answer the original questions or to gauge the extent of the factors listed above. However, bits of information are available thanks to independent surveys, such as the University of Hawai'i Alumni Outcomes Survey and the Kamehameha Schools Alumni Survey. The former reports an increase in the number of graduates who are living and working outside the state: roughly 30%, representing an increase of 8.3% since 1994 (Creamer, 2003). The Kamehameha Schools Alumni Survey shows an even larger percentage leaving the state: 49%. However, the survey goes further to report that over 40% of those who leave the state eventually *return* to Hawai'i (Policy Analysis & System Evaluation, unpublished tabulation 2003).

These statistics pose interesting questions:

1. Does the "brain drain" really exist? That is, are Hawaiians with higher educational attainment and skills more likely to leave the state for the U.S. continent than are their peers with less education and fewer skills? Furthermore, does the brain drain extend to other areas of well-being, such as wage/salary income or home ownership?

2. Does any amount of "brain gain" occur? In other words, do those who depart the islands return with higher levels of education, skill, or socioeconomic standing? For instance, while Hawaiians within the state are leaving for the U.S. continent, perhaps the flow is circular in nature, resulting in an eventual return. And upon their return, the returning *kānaka* (Hawaiians) may have higher education and socioeconomic levels than those of Hawaiians who remain in-state and those who remain on the U.S. continent.

From these questions, we can develop a set of two testable hypotheses. Rather than attempting to uncover the motivations and factors influencing actual migration, these hypotheses focus instead on describing Hawaiians who leave the state and those who return to the state.

1. Hawaiians who leave the state for the U.S. continent experience higher educational and socioeconomic returns than do those who remain.

2. Hawaiians who leave the state and eventually return from the U.S. continent exhibit higher educational and socioeconomic returns compared with Hawaiians who remain in the state and those who relocate permanently on the U.S. continent.

Data and Methods

The analyses presented here are based on the Census 2000 Public Use Microdata Sample 1-percent file (PUMS1). These data represent a subsample of the Census 2000 sample (long-form) data file, providing individual researchers with statistically representative data on the U.S. population in 2000 while maintaining strict adherence to respondent confidentiality.

On the basis of previous (as-yet-unpublished) research, I find that Native Hawaiians are seriously underrepresented in the PUMS1 file: Census 2000 100-percent data show that 401,162 Native Hawaiians resided in the United States in 2000, whereas PUMS1 data permit the identification of only 302,788 Hawaiians, resulting in an absence of nearly one-quarter of the entire U.S. Hawaiian population.[1] To circumvent this limitation of the data, I enhanced the coding of Native Hawaiian to include all individuals who reported Hawaiian in the Census 2000 ancestry question as well. This proxy brings the estimated Hawaiian population in PUMS1 to within 7,000 of the actual Census 2000 count.

The data are used in both statistical tabulations and inferential ordinary least squares (OLS) and logit models using SAS® software. These tabulations and models are run separately for different types of Hawaiian migrants. I derive these migrant classifications from three PUMS1 variables: place of birth, residence in 1995, and residence in 2000. From these three geo-temporal data points, I am able to classify Hawaiian individuals according to their whereabouts at various points in time: islanders, departees, returnees, and continentals. Table 1 provides a simplified version of the logic used to classify each individual.

Table 1. Migrant classifications

	Place of birth		Residence in 1995		Residence in 2000	
Group	Hawai'i	Continent	Hawai'i	Continent	Hawai'i	Continent
Islander	X		X		X	
Departee	X		X			X
	X			X		X
		X	X			X
Returnee	X			X	X	
		X	X		X	
		X		X	X	
Continental		X		X		X

The first category, *islander*, refers to individuals who were located in Hawai'i at each point in time: birth, 1995, and the census year 2000. For young people, such as a 10-year-old child, being in Hawai'i at birth, at age 5, and at the time of the census is likely to accurately support classification as a life-long resident. For older individuals who fall into the islander category, there is greater likelihood of times spent out-of-state between the time of birth and the year 1995. Consequently, the islander classification requires an assumption of permanence between geo-temporal checkpoints.

Conversely, the fourth group, *continental*, refers to those Hawaiians who were situated *anywhere but Hawai'i* at the same three times. That is, if a Hawaiian individual reports various out-of-state locations at birth, in 1995, and at the time of the census, the assumption follows that he or she has never resided within the state.

Departees are those Hawaiians who left the state of Hawai'i at some point and remained out of the state at the time of the 2000 census. Departees can include Hawaiians born in the state who may or may not have been in-state in 1995 but who had left by the time of Census 2000. Departees can also include Hawaiians born out-of-state who had returned by 1995, yet left by the time of Census 2000. Again, this category simply represents Hawaiians who have resided in Hawai'i at some point in time but had left by the time of the census in 2000.

Finally, *returnees* are those Hawaiians who spent some time out-of-state but had returned by the year 2000. Like departees, returnees may have been born in-state or out-of-state: The only requisite is that they were counted as residents of Hawai'i in Census 2000. For Hawaiians born in-state, this would mean that they reported residence elsewhere in 1995 but had returned to their place of birth by the time of the census. For Hawaiians born elsewhere—a place other than Hawai'i—their presence in Hawai'i in 2000 marks a more conceptual return: a return to one's ancestral home.

Although elementary in nature, these categorizations permit slightly greater clarity in understanding the overall outcomes of Hawaiians who move about and those who do not than would a simple in-state versus out-of-state comparison. Although I make use of all possible geo-temporal variables in PUMS1, it is conceivable that the migrant status of many Hawaiians could be misclassified. Consider, for example, a woman born in Hawai'i who traveled to California for schooling, began her career in Chicago, married and resettled in New York, and returned to Hawai'i in 1995 to retire. A case such as this would be coded as "islander" in spite of a lifetime of migratory behavior.

The lack of comprehensive lifetime data is not unique to this analysis: Most research that seeks to uncover inferential or causal associations is victim to an absence of longitudinal data. Having repeated measures of specific populations over time permits the analysis of trends, change, and causal mechanisms. However, owing to the parallel difficulty of obtaining data that provide a nationally representative sample of Native Hawaiians, the PUMS1 data provide data users with a snapshot

of the Hawaiian population in the year 2000. This cross-sectional analysis relies on some basic assumptions about causal ordering and direction to mitigate the one-moment-in-time limitation.

Because the principal research question concerns the loss of skilled and productive Hawaiians *from* their ancestral homeland Hawai'i (i.e., brain drain), I restrict the data to eliminate Hawaiians *born outside the state*. This includes all continentals as well as selected departees and returnees. Although the experiences and characteristics of these Hawaiians are interesting and fascinating in their own right, and certainly worthy of additional research, they fail to meet a basic prerequisite for inclusion here: namely, being *at risk* of leaving (or returning to) Hawai'i. Ongoing research on the migration of Hawaiians will continue to observe Hawaiians born outside the state, but for the purposes of this article, they are omitted.

Finally, because many measures of well-being are often associated with adult accomplishments, I limit the observations used in these analyses to Hawaiian adults, age 25 and older.

Results

Descriptive Statistics

Table 2 presents some descriptive statistics of the Hawai'i-born Hawaiian adult population based on the migrant statuses mentioned above. These general measures provide a glimpse of the basic differences in characteristics among Hawaiians who remain in the state, those who leave for the continent, and those who return. On average, islanders (41.3%) are roughly five years younger than departees (46.2%) who, in turn, are roughly five years younger than returnees (51.5%). As one might expect given the mean ages above, islanders are more likely to be enrolled in school (7.7%) compared with departees (6.0%) and returnees (4.5%). Islanders are also more likely to be unmarried (37.7%), departees are more likely to be married to non-Hawaiians (58.4%), and returnees are more likely to be married to fellow Hawaiians (41.3%). Hawaiians of mixed-Chinese heritage are less likely to have lived on the continent in 2000: Only 4.3% of departees were in this ethnic category, compared with 13.1% and 11.2% of islanders and returnees,

Table 2. Descriptive statistics of Hawaiian-born Hawaiian population, 25 years and older, by migrant status *(percentage, unless otherwise noted)*

Variable			Islander	Departee	Returnee
Demographic characteristics	Mean age		41.3	46.2	51.5
	Sex: Percentage male		45.1	45.5	44.2
	Marital status	Unmarried	37.7	28.3	24.2
		Married to Hawaiian	33.1	13.3	41.3
		Married to non-Hawaiian	29.2	58.4	34.5
Ethnic heritage	Pure Hawaiian		39.4	45.2	40.5
	Part-Hawaiian and White		10.1	12.6	15.3
	Part-Hawaiian and Chinese		13.1	4.3	11.2
	Part-Hawaiian and Filipino		2.7	2.9	1.7
	Part-Hawaiian and Japanese		5.9	4.4	5.3
	All other Hawaiian race combinations		28.7	30.6	26.0
Educational background	Enrolled in school		7.7	6.0	4.5
	Educational attainment	No college degree	88.9	80.7	83.6
		Bachelor's degree	9.0	11.5	9.9
		Graduate/prof. degree	2.1	7.8	6.5
Individual considerations	Linguistic isolation		0.0	0.8	0.3
	Disabled		20.3	20.3	21.7
	Veteran of Armed Forces		9.6	22.3	18.1
	Mean household size		3.5	3.0	3.9
Labor force participation	Employed civilian		66.8	71.5	64.1
	Employed Armed Forces		0.5	1.0	0.2
	Unemployed		6.4	2.5	3.4
	Not in labor force		26.3	25.0	32.3
Industry	Management, professional, administrative		10.9	15.0	11.8
	Tourism		12.9	6.8	10.0
	Construction		4.3	4.6	5.8
	Agriculture, forestry, fishing, hunting		3.5	0.5	1.7
	All other industries		68.4	73.1	70.7

respectively. Additionally, islanders are far less likely to be veterans of the Armed Forces (9.6%), while approximately one in five departees and returnees are former military (22.3% and 18.1%, respectively).

Table 3 offers a similar glimpse of various socioeconomic outcomes, such as incomes, poverty status, college attendance, self-employment, and home ownership. In this bivariate view of Hawaiian well-being, nearly every indicator suggests that islanders are at a deficit in comparison with departees and returnees. Such dire statistics—such as only 27.5% of islanders owning their own home compared with well over 50% of departees and returnees—might satisfy those seeking evidence of a brain drain. However, such an important phenomenon—one that, at the very least, strikes at the heart of Western ideas of well-being—warrants a closer look.

Table 3. Well-being outcomes of Hawaiian-born Hawaiian population, 25 years and older, by migrant status *(percentages, unless otherwise specified)*

Outcome	Islander	Departee	Returnee
Income (in dollars)			
Mean earnings	21,415	26,760	26,154
Mean wage/salary income	20,375	25,650	25,329
Mean total income	26,151	31,249	32,635
Poverty (at or below 100%)	20.5	6.9	8.3
College education (bachelor's degree or higher)	11.0	19.3	16.4
Self-employed	5.9	8.9	4.7
Home ownership	27.5	60.3	71.4

Although informative, simple tabulations such as these cannot provide any indication of the factors most closely associated with socioeconomic advantage. For example, although departees are more likely to be veterans and to have a degree, one does not necessarily influence the other. For this reason, I conduct regressions to discern the factors most closely associated with certain socioeconomic outcomes.

Higher Education

Table 4 shows the results from a multistage logistic regression. The dependent variable is educational attainment, where a value of 1 denotes the acquisition of a college (bachelor's) degree or higher, and a value of 0 signifies less than a college degree. In each of the successive columns, different predictor (or independent) variables are added to the model. In Column 1, only the migrant status categories are included as potential predictors of educational attainment. By omitting the nonmigrant category (islanders), we force the model to compare the effects of departee status and returnee status relative to islander status; that is, to assess whether departees or returnees exhibit a significant advantage over islanders with respect to educational outcomes. For this simple model, in which college completion is predicted by migrant status alone, we find that departees appear to have a significantly greater likelihood of holding a bachelor's degree than do islanders: Specifically, departees are 1.9 times more likely to have a bachelor's degree than are their islander counterparts. Returnees, however, do not differ statistically from islanders with respect to educational attainment.

While informative, the analysis presented in Column 1 presents a very narrow view of possible predictors of educational outcomes. In fact, the "Max rescaled *R*-square" statistic located at the bottom of Column 1 in Table 4 indicates that the model explains only 1% of the variance observed in the dependent variable. Consequently, it is advisable to expand the model to incorporate other potentially influential factors to better account for the observed variance. Further, the addition of other explanatory variables might result in changes in the coefficients for the migrant status variables, which may be masking the effects of other correlated variables. In Column 2, some general demographic measures—age, sex, and marital status—were added to the model. The coefficient for departees remains statistically significant but has diminished in magnitude: When accounting for demographic characteristics, departees are only 1.7 times more likely than islanders to have a bachelor's degree. Among demographic variables, only marital status shows significant effects. Holding migrant status constant, Hawaiians married to other Hawaiians are 39% less likely to have a college degree compared with unmarried Hawaiians. Conversely, Hawaiians who are married to non-Hawaiians are 1.5 times more likely have a college degree. The inclusion of these additional explanatory variables, as shown by the R-squared statistic, accounts for roughly 5% of the total variance, an improvement of 4 percentage points over the model presented in Column 1.

Table 4. Logistic Regression Likelihoods of Having a College Degree (Bachelor's Degree or Higher) Universe: Hawaiian-born Hawaiian adults, age 25 and older.

	Column 1			Column 2			Column 3			Column 4			Column 5		
Parameter	Estimate	*SE*	Odds	Estimate	*SE*	Odds	Estimate	*SE*	Odds	Estimate	*SE*	Odds	Estimate	*SE*	Odds
Intercept	-2.0919	0.1935***		-1.7678	0.8982*		-1.6243	0.9093		-1.6046	0.9270		-2.0300	0.9258*	
Migrant status															
Islander (omitted)															
Departee	0.6434	0.2327**	1.903	0.5311	0.2430*	1.701	0.5572	0.2470*	1.746	0.5621	0.2482*	1.754	0.5266	0.2569*	1.693
Returnee	0.2942	0.2262	1.342	0.4553	0.2413	1.577	0.4712	0.2434	1.602	0.4882	0.2444	1.629	0.4864	0.2508	1.626
Demographic characteristics															
Age				-0.00993	0.0376	0.990	-0.0115	0.0377	0.989	-0.00641	0.0379	0.994	-0.0243	0.0381	0.976
Age, squared				-0.00003	0.000365	1.000	-0.00003	0.000365	1.000	-0.00005	0.000367	1.000	0.000217	0.000373	1.000
Male				0.2566	0.1609	1.293	0.2441	0.1628	1.276	0.3363	0.1803	1.400	0.4834	0.1878**	1.622
Unmarried (omitted)															
Married to Hawaiian				-0.4895	0.2429*	0.613	-0.4941	0.2457*	0.610	-0.4447	0.2600	0.641	-0.4380	0.2643	0.645
Married to non-Hawaiian				0.3859	0.1952*	1.471	0.4050	0.1975*	1.499	0.4302	0.2052*	1.538	0.4410	0.2110*	1.554
Ethnic heritage															
Pure Hawaiian (omitted)															
Part-Hawaiian and White							-0.3857	0.2928	0.680	-0.3969	0.2931	0.672	-0.3730	0.2999	0.689
Part-Hawaiian and Chinese							0.3739	0.2669	1.453	0.3524	0.2681	1.422	0.3923	0.2762	1.480
Part-Hawaiian and Filipino							-1.8608	0.7336*	0.156	-1.8721	0.7340**	0.154	-1.8025	0.7392*	0.165
Part-Hawaiian and Japanese							-0.1564	0.5109	0.855	-0.1056	0.5141	0.900	0.1019	0.5274	1.107
All other Hawaiian race combinations							-0.0680	0.1948	0.934	-0.0717	0.1952	0.931	-0.0411	0.1997	0.960
Individual considerations															
Liguistic isolation										-12.5119	539.3	<0.001	-13.0678	531.8	<0.001
Disabled										-0.2888	0.2156	0.749	-0.0603	0.2261	0.941
Veteran of Armed Forces										-0.2559	0.2461	0.774	-0.3795	0.2558	0.684
Household size										-0.0516	0.0512	0.950	-0.0565	0.0528	0.945
Labor force participation															
Employed civilian													1.0227	0.2404***	2.781
Employed armed forces													1.2267	0.9394	3.410
Unemployed													0.0754	0.6486	1.078
Not in labor force (omitted)															
Industry															
Management, professional, administrative													-0.8035	0.3808*	0.448
Tourism													-1.1437	0.3652**	0.319
Construction													-1.0609	0.7040	0.346
Agriculture, forestry, fishing, hunting													-0.9909	1.0993	0.371
All other industries (omitted)															
Likelihood ratio chi-square	8.6519			33.1953			50.5553			55.9529			106.6258		
d.f.	2			7			12			16			23		
Max-rescaled R-square	0.0120			0.0456			0.0689			0.0761			0.1422		

Each successive model in Table 4 introduces more covariates. In Column 3, I introduce ethnic heritage. Although only one measure of Hawaiian ethnic mix is significant—Filipino Hawaiians are 85% less likely to hold a college degree than are pure Hawaiians—the ethnicity predictors account for an additional 2 percentage points of the observed error in the model. Further, the effects of departee status and detailed marital status persist at similar levels as in the previous model. In Column 4, individual considerations are presented. The individual considerations are extenuating circumstances that could differentially affect one's probabilities of obtaining a college degree or other measures of high socioeconomic standing: linguistic isolation (where a certain proportion of adults do not speak English fluently), disability status, veteran status, and household size (as a proxy for limited household resources). None of these variables prove significant, nor do they alter the effects of the existing variables within the model (with exception of marriage to a fellow Hawaiian, which fails to achieve significance). In the final column (Column 5), I add employment-oriented variables to complete the model: labor force participation and industry. These variables suggest that employed civilians are more likely to hold a college degree whereas those working in white-collar and tourism industries are less likely to have their bachelor's degrees, all else constant.

Throughout the exercise of building the full explanatory model from Column 1 to Column 5, one finds that the significant advantage of departees—Hawaiians who have left the islands for the U.S. continent—persists regardless of the other explanatory variables added to the model. Such a finding lends support for the existence of an actual brain drain, whereby Hawaiians with higher degrees are relocating to the U.S. continent, even after controlling for other potentially influential factors.

Wage and Salary Income

Table 5 shows the results from a similar multistage model, using OLS regression. The dependent variable is logged wage and salary income.[2] Again, Column 1 presents a simple model in which the migrant status categories are the only independent variables. These coefficients show significant differences between both departees and islanders, and returnees and islanders. Departees and returnees are roughly 20% more likely to have higher wage and salary income than are islanders, without controlling for any other explanatory factors. This reduced form

Table 5. Ordinary Least Squares (OLS) Coefficients Predicting Logged Wage and Salary Income Universe: Hawaiian-born Hawaiian adults, age 25 and older.

	Column 1		Column 2		Column 3		Column 4		Column 5		Column 6	
Parameter	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
Intercept	9.90028	0.06593***	7.63949	0.38555***	7.68133	0.39127***	7.85093	0.39233***	7.87597	0.39692***	7.64478	0.38333***
Migrant status												
Islander (omitted)												
Departee	0.23108	0.08593**	0.16895	0.08573*	0.16784	0.08674	0.14259	0.08558	0.13931	0.08568	0.09548	0.08347
Returnee	0.21172	0.08133**	0.18652	0.08287*	0.18468	0.08326*	0.16299	0.08215*	0.15557	0.08235	0.13374	0.07903
Demographic characteristics												
Age			0.09529	0.01700***	0.09423	0.01711***	0.08591	0.01705***	0.08318	0.01710***	0.06952	0.01659***
Age, squared			-0.00101	0.00017578***	-0.00100	0.000177***	-0.00092520	0.00018***	-0.00090667	00017561***	-0.00075212	0.00017076***
Male			0.43295	0.06073***	0.43077	0.06117***	0.41989	0.06030***	0.35959	0.06654***	0.31585	0.06702***
Unmarried (omitted)												
Married to Hawaiian			-0.10476	0.08334	-0.10638	0.08407	-0.08278	0.08302	-0.12865	0.08931	-0.12508	0.08562
Married to non-Hawaiian			0.03589	0.07644	0.04365	0.07716	0.03526	0.07621	0.00002232	0.07906	0.00301	0.07587
Ethnic heritage												
Pure Hawaiian (omitted)												
Part-Hawaiian and White					-0.01007	0.10232	0.02330	0.10100	0.01936	0.10079	0.02573	0.09668
Part-Hawaiian and Chinese					0.03033	0.11468	0.00533	0.11323	0.00219	0.11300	0.02142	0.10846
Part-Hawaiian and Filipino					-0.15456	0.14696	-0.09757	0.14534	-0.09922	0.14510	-0.04495	0.13981
Part-Hawaiian and Japanese					-0.12239	0.20341	-0.06397	0.20064	-0.09882	0.20134	-0.07432	0.19384
All other Hawaiian race combinations					-0.01228	0.07371	-0.01229	0.07261	-0.01306	0.07258	0.00374	0.06970
Educational background												
Enrolled in school							-0.34668	0.13207**	-0.35988	0.13180**	-0.35962	0.12634**
Attainment: No college degree (omitted)							...		...		...	
Attainment: Bachelor's degree							0.29291	0.09425**	0.28926	0.09407**	0.26401	0.09106**
Attainment: Graduate/prof. degree							0.52784	0.12559***	0.55437	0.12585***	0.53187	0.12163***
Individual considerations												
Liguistic isolation									0.32676	0.45071	0.23801	0.43262
Disabled									-0.09468	0.08460	-0.00352	0.08245
Veteran of Armed Forces									0.20983	0.09068*	0.23437	0.08874**
Household size									0.02788	0.01927	0.02056	0.01851
Labor force participation												
Employed civilian											0.62103	0.09463***
Employed Armed Forces											0.45215	0.34105
Unemployed											-0.31391	0.19065
Not in labor force (omitted)												
Industry												
Management, professional, administrative											0.19299	0.10891
Tourism											0.03989	0.09316
Construction											0.13415	0.15295
Agriculture, forestry, fishing, hunting											-0.68650	0.21912**
All other industries (omitted)												
Model sum of squares	7.66513		81.75210		83.05741		106.58516		113.63631		175.24350	
d.f.	2		7		12		15		19.0000		26.0000	
R-square	0.0097		0.1033		0.1049		0.1347		0.1436		0.2214	
Adjusted R-square	0.0074		0.0961		0.0926		0.1198		0.1248		0.1979	

* $p<.05$ ** $p<.01$ *** $p<.001$

of a model would suggest that, again, migrant status does appear to influence well-being outcomes among Hawaiians: in this case, wage and salary income. However, as stated earlier, simple bivariate analyses fail to account for the other factors that play an important role in the lives of many Hawaiians.

Each successive model presented in Table 5 introduces additional covariates. In Column 2, general demographic variables are introduced: age, sex, and marital status. The addition of these controls reduces the magnitude (coefficient) and strength (standard error) of the effect of migrant status. This occurs because the migrant effects are mitigated by the stronger effects of age and sex: With every year closer to prime working ages, Hawaiians are more likely to earn higher wages; and men are over 40% more likely to receive more wage and salary income compared with women. The difference between the first two models illustrates the overall trend shown in Table 5, in which the seemingly high association between migrant status and wage/salary income disappears when other, more relative factors are considered. For example, when ethnic heritage variables are added in Column 3, none of the new measures reach significance (i.e., statistically different from zero), yet they account for enough of the observed variance to mitigate the significant differences between departees and islanders. This means that, when controlling for age, sex, marital status, and racial composition, there is no significant difference in wages between Hawaiians who stay in the state and those who leave, which is contrary to the original brain drain hypothesis. Further, returnees remain significantly different from islanders, being 20% more likely to earn higher wages, suggesting a possible brain gain.

The effects of migrant status persist when educational background is considered (Column 4) but drop out of significance when individual considerations are introduced (Column 5). Further, the final model (Column 6), which incorporates employment status and industry and accounts for nearly 20% of the observed variance, suggests there is no significant difference between Hawaiians who remain in the state (islanders) and those who leave (departees) or those who return (returnees) with respect to wage and salary income. This finding, in effect, contradicts the brain drain theory with respect to wages: If Hawaiians with higher educational attainment and skills are emigrating from the state, they are not necessarily realizing higher wages relative to their in-state counterparts.

Table 6. Logistic Regression Likelihoods of Owning a Home Universe: Hawaiian-born Hawaiian adults, age 25 and older.

	Column 1			Column 2			Column 3			Column 4			Column 5			Column 6		
Parameter	Estimate	SE	Odds	Estimate	SE	Odds	Estimate	SE	Odds	Estimate	SE	Odds	Estimate	SE	Odds	Estimate	SE	Odds
Intercept	-0.8282	0.1316***		-5.3385	0.7604***		-5.3199	0.7720***		-5.3404	0.7884***		-5.6138	0.8100***		-5.8570	0.8272***	
Migrant status																		
Islander (omitted)																		
Departee	1.4264	0.1689***	4.164	1.0739	0.1863***	2.927	1.0568	0.1885***	2.877	1.0179	0.1899***	2.767	1.0453	0.1914***	2.844	1.0000	0.1956***	2.718
Returnee	1.8182	0.1606***	6.161	1.3385	0.1745***	3.813	1.3409	0.1752***	3.822	1.3276	0.1763***	3.772	1.3079	0.1773***	3.698	1.3016	0.1788***	3.675
Demographic characteristics																		
Age				0.1246	0.0306***	1.133	0.1257	0.0308***	1.134	0.1235	0.0312***	1.131	0.1278	0.0315***	1.136	0.1252	0.0321***	1.133
Age, squared				-0.00073	0.000294*	0.999	-0.00074	0.000295*	0.999	-0.00072	0.000299*	0.999	-0.00071	0.000300*	0.999	-0.00065	0.000310*	0.999
Male				-0.0623	0.1340	0.940	-0.0764	0.1349	0.926	-0.0868	0.1360	0.917	-0.0434	0.1510	0.957	-0.0109	0.1599	0.989
Unmarried (omitted)																		
Married to Hawaiian				0.7163	0.1742***	2.047	0.7204	0.1760***	2.055	0.7479	0.1775***	2.113	0.6141	0.1896**	1.848	0.6289	0.1908**	1.876
Married to non-Hawaiian				1.3421	0.1666***	3.827	1.3591	0.1680***	3.893	1.3484	0.1694***	3.851	1.2638	0.1744***	3.539	1.2892	0.1759***	3.630
Ethnic heritage																		
Pure Hawaiian (omitted)																		
Part-Hawaiian and White							-0.0886	0.2229	0.915	-0.0583	0.2244	0.943	-0.0533	0.2259	0.948	-0.0388	0.2268	0.962
Part-Hawaiian and Chinese							-0.1101	0.2472	0.896	-0.1430	0.2495	0.867	-0.1766	0.2509	0.838	-0.1547	0.2520	0.857
Part-Hawaiian and Filipino							-0.4270	0.3053	0.652	-0.3369	0.3075	0.714	-0.3758	0.3093	0.687	-0.3196	0.3128	0.726
Part-Hawaiian and Japanese							0.2900	0.4615	1.336	0.3031	0.4669	1.354	0.3229	0.4707	1.381	0.4164	0.4741	1.516
All other Hawaiian race combinations							-0.0143	0.1650	0.986	-0.00585	0.1659	0.994	-0.0271	0.1668	0.973	-0.0162	0.1681	0.984
Educational background																		
Enrolled in school										-0.4673	0.3007	0.627	-0.4836	0.3008	0.617	-0.4963	0.3024	0.609
Attainment: No college degree (omitted)																		
Attainment: Bachelor's degree										0.6264	0.2463*	1.871	0.6269	0.2486*	1.872	0.5589	0.2523*	1.749
Attainment: Graduate/prof. degree										0.8077	0.3309*	2.243	0.8069	0.3325*	2.241	0.7198	0.3356*	2.054
Individual considerations																		
Liguistic isolation													-0.1713	1.0902	0.843	-0.3252	1.0969	0.722
Disabled													-0.4176	0.1668*	0.659	-0.3205	0.1719	0.726
Veteran of Armed Forces													-0.0470	0.2089	0.954	-0.1052	0.2145	0.900
Household size													0.0647	0.0400	1.067	0.0662	0.0404	1.068
Labor force participation																		
Employed civilian																0.3344	0.1737	1.397
Employed Armed Forces																0.4066	0.9048	1.502
Unemployed																-0.3297	0.3723	0.719
Not in labor force (omitted)																		
Industry																		
Management, professional, administrative																0.1387	0.2867	1.149
Tourism																0.0430	0.2306	1.044
Construction																-0.3803	0.3943	0.684
Agriculture, forestry, fishing, hunting																-1.0052	0.5421	0.366
All other industries (omitted)																		
Likelihood ratio (chi-square)	143.9966			317.8286			320.5984			334.6815			344.0864			354.9073		
d.f.	2			7			12			15			19			26		
Max rescaled R-square	0.1465			0.3024			0.3047			0.3164			0.3241			0.3330		

* p<.05 ** p<.01 *** p<.001

Home Ownership

Table 6 performs the same exercise using a logistic regression to predict the likelihood of home ownership (at the place of residence), which is a common measure of socioeconomic well-being. While measuring actual histories of home ownership would shed considerable light on the overall well-being of Hawaiians, especially those who have changed residences throughout their lifetimes, the PUMS1 data only permit the measurement of housing tenure (home ownership vs. rental) at the time of Census 2000. Consequently, any interpretations of the findings from these models should consider potential lifetime strategies for housing acquisition that may be unique to each migrant group, such as using increases in home equity from continental housing to fund housing purchases within Hawai'i.

In this instance, the initial effects of migrant status (with no other controls) are quite large and significant: Departees are over four times more likely to own their homes than are islanders (odds ratio of 4.2); and returnees are over six times more likely to own their homes (odds ratio of 6.2), as shown in Column 1.

Like the trends shown in the wage models, the addition of other covariates diminishes the effect of migrant status. However, unlike the wage models, migrant status never fails to reach significance, even after all categories of independent variables are introduced. The fully realized model shows strong effects of educational attainment, age, and marital status. However, all pale in comparison with the effects of migrant status. Departees are nearly three times more likely to own a home than are islanders, providing strong support for the brain drain theory. However, the model also shows that returnees are almost four times more likely to own a home. The higher odds ratio for returnees than that of departees suggests that returnees are more likely to enjoy higher socioeconomic well-being in terms of home ownership than are departees. These findings lend support to a theory of a brain gain in terms of socioeconomic status (as represented by home ownership).

Conclusions

When considering a concept as expansive (and often vague) as "brain drain," it would appear that any conclusions are highly dependent on the manner in which the expression is operationalized. The three variations presented here suggest somewhat ambiguous results.

When modeling the acquisition of a college degree, there remains strong evidence of a brain drain. Departees consistently exhibit significantly greater likelihoods of higher educational achievement, whereas returnees are no different, statistically speaking, than islanders. Even after controlling for age, which would account for the younger continental Hawaiians who are more likely to pursue educational opportunities, departees are nearly twice as likely to hold degrees. However, it must be noted that this finding may be more indicative of Hawaiians who are still in the process of accumulating their skills and resources to return to the difficult economic market in the state of Hawai'i. Further, this analysis does not imply that relocating to the U.S. continent *results in* a college degree; instead, it merely assesses the people who hold those degrees and where they are located at certain points in time.

Of the many implications of an educational brain drain, the most notable is the diaspora in the Hawaiian population that can potentially lead to cultural loss and identity confusion. Additionally, the absence of highly educated and highly skilled Hawaiians results in a vacuum within the Hawaiian community, in which potential leaders, teachers, and role models are separated from the young Hawaiians who would seek to know and do more to achieve socioeconomic parity with the other ethnic groups in the state. The low proportion of Native Hawaiians in professional, managerial, and educational occupations within the state denies students and less-experienced workers exposure to examples of Hawaiians performing (and excelling) in positions of prestige, power, and knowledge.

However, the other findings of the analysis suggest that the brain drain may not be as pervasive as imagined. When modeling wage and salary income, there is no significant effect of migrant status. That is, when controlling for other characteristics, departees and returnees are no more likely than islanders are to earn higher wages. This finding contradicts brain drain theories that would place departees at an economic advantage over islanders. Further, in the analysis of home ownership, returnees show greater returns than those of departees, both of which fare

considerably better than islanders. This finding offers support for a net Hawaiian brain gain in some respects. For some, the costs of a temporary drain may be worth the rewards of an eventual gain. That is, if Hawaiians are moving to the continent to accumulate the necessary skills, experiences, connections, and wealth in order to return to the islands at higher socioeconomic standing, then their absence may not be the social ill so often advertised.

Future research plans in this area include adjustment of incomes to account for cost-of-living differences between Hawai'i and other states, greater temporal precision, data mining to increase the explanatory power of various statistical models, and alternative definitions of brain drain. Further, the larger project from which this article is derived will examine the actual forces that propel Hawaiians to move to the U.S. continent and, when applicable, return. By understanding these concepts, researchers, policymakers, and the public will be better equipped to fashion possible policies and programs to circumvent the potential cultural loss to which departing Hawaiians may contribute.

Additionally, policies and programs designed to promote a return to the backbone, could help minimize continental stays among Hawaiians by providing incentives for relocating back to the state. Similar policies have achieved success in European countries, such as Italy, which grants citizenship to the children and grandchildren of earlier emigrants. Repatriation policies such as this can strengthen the Hawaiian population in the state not only politically, socially and even economically, but also culturally, owing to the importance of 'āina, 'ohana, and mo'okū'auhau—traditional Hawaiian values best lived and practiced in the Hawaiian Islands.

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Notes

1 The PUMS1 data files permit the identification of only specific race groups and combinations owing to confidentiality and threshold guidelines. Consequently, many Hawaiians of less-prevalent race combinations may be coded in the "All other race combinations" category.

2 Taking the natural log of income measures most closely approximates a normal distribution, a necessary assumption for OLS regressions.

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