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Greener Pastures Abroad?: 'From Study to Stay' Intention of the Foreign-Trained

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Abstract

Using a binary logit model, this paper addresses the question of intention change, rather than the more typical issue of whether or not a student returns home. The empirical findings from this paper add to the sparse literature of intention change. Three-fourths of the students in the sample do not change their intention. The students who changed their intention have, on average, stayed in New Zealand for slightly more than 3 years. Those who have not changed their intention have, on average, only stayed in New Zealand for about 2½ years. Doctoral students and students from the health science discipline are more likely to change their intention. The longer a student stays in New Zealand, the likelier he is to change his intention. Male students are less likely to change their intention. So are the students whose initial intentions are to return. Surprisingly, no perception-related variables are significant in terms of their marginal effect on intention change.

Keywords: Student nonreturn/migration, intention change, return intention, binary logit, skilled migration, brain drain

1. Introduction

When a student goes for study abroad, he goes with a certain return intention. Rather than looking at the more typical question of whether or not a student intends to return, this paper looks at the determinants of students' change of return intention, i.e., how and why their initial intentions differ from their current intentions.

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This paper is an empirical contribution to add to the sparse literature on change of return intention.

The majority of the studies on student non-return have dealt with university-level students, with Gibson and McKenzie (2011) as a notable exception. They examined the migration decision of high school level graduates in three Pacific countries (Tonga, Papua New Guinea, and New Zealand). They examined what pushes top high school graduates to migrate abroad and what attracts them to come back home. Some studies have looked specifically at doctoral-level students (Jayme, 1982; Kao & Lee, 1973) and at masters' level students (Baruch et al., 2007). Students aside, a number of studies reviewed here have examined the issue of working professionals and expatriates. Brown and Connell (2004) examined what determines the migration intentions of health professionals from the Pacific Islands to New Zealand and Australia, and Gani and Ward (1995) looked at the determinants of Fijian professionals' actual brain drain into New Zealand. Jackson et al. (2005), on the other hand, looked at the return intent of Kiwi expatriates and found that almost a third of them intended to remain abroad permanently.

There are two studies dealing with the return intention change of students studying abroad. Jayme (1982) looked at the intention change of the 1970 cohort of graduate students from the Philippines studying in the U.S., focusing on demographic and socio-psychological factors. Using indices and score methods, Jayme looked at why the students had failed to return home although they had earlier intended to do so. The main conclusion was that social experiences while in the U.S. were the primary determinants of intention change. As part of her study, Szelenyi (2006) examined the intention change of twenty-six international graduate students studying at an U.S. university using in-depth interview and qualitative methods. She compared the students' initial intentions and post-graduate intentions, and concluded the main determinants of intention change to be information access, social ties in the U.S. and at home, as well as professional aspirations.

This study differs from that of Jayme's by incorporating perception-related and education-related variables. This study also differs from that of Jayme's and Szelenyi's in its adoption of quantitative analysis, with discrete choice models as the primary method as compared to their mostly descriptive methods. Key findings are as follows. Doctoral students and students from the health science discipline are found to be more likely to change their intention. The longer a student stays in New Zealand, the likelier he is to change his intention as well.

On the other hand, male students are less likely to change their intention. So are the students whose initial intention is to return.

2. Data and Methodology

2.1Data

Individual level data are used in this study. These data are obtained through a web-based questionnaire survey distributed via the two participating universities' international offices (University of Otago and University of Canterbury). The other six remaining universities in New Zealand declined to participate in the survey. The survey was conducted between March and May 2008. There were 512 respondents from Otago and 269 from Canterbury, with response rates of 31.4% and 24.1%. The lower response rate from Canterbury may be due to the questionnaire being sent out just once instead of three times at Otago. After excluding students who were bonded by their scholarships to return home and cleaning the data for duplicates, the final usable sample contains 623 respondents. The total number of the target population for this study is 20,515 international students, which is the total number of international students studying at tertiary-level courses in New Zealand at the time of the survey. The current sample size of 623 should be adequate for maximum likelihood estimation, which preferably needs more than 500 observations (Long, 1997).

Section 2 here deals primarily with the dichotomous question of whether or not a student changed his return intention, and the factors determining such changes (also to be understood as non-changes). There is a change of intention if the initial return intention differs from the current return intention. A binary logit model is used to model the determinants of an intention change.

Due to the nonlinear nature of the binary logit model, its results are discussed in terms of marginal effects and discrete changes in hypothetical scenarios to gain a more comprehensive understanding of the results. The model is then subjected to model specification tests and robustness checks.

2.2 Model Specification

The binary dependent variable here is whether or not the students have changed their return intention. A change of intention is defined here as the difference between the initial return intention and the current return intention. Let the structural model be as follows.

$$Y^* = \boldsymbol{X\beta} + \varepsilon \quad ; Y = 1 \text{ if } Y^* > 0 \text{, 0 otherwise} \qquad (1)$$

Y^* is the underlying continuous latent variable, representing the unobserved inclination of an intention change. Since Y^* is unobserved, we can only observe its discrete version, Y, which is the actual outcome, i.e., whether or not a student's intention has changed. A positive outcome, *Y=1*, denotes a change of intention. A negative outcome, *Y=0*, denotes an unchanged intention. Assuming a logistically distributed error term from the structural model in (1), the probability of an intention change is:

$$P(Y = 1 \mid \boldsymbol{X}) = \Lambda(\boldsymbol{X\beta}); \ \Lambda \text{ is the logistic cdf} \qquad (2)$$

The choice between a binary logit and probit is arbitrary. It usually follows the convention of the research discipline (Long, 1997, p. 120). The binary logit model is used here to take advantage of its odds ratio interpretation. The binary probit model has no odds ratio equivalent. Before analysing the model's odds ratios, the next section gives a brief overview of some descriptive statistics.

3. Results and Discussion

3.1 Descriptive Statistics

Table 1 shows the breakdowns of the explanatory variables by the dichotomous outcome variable, i.e., *Y=Changed; Y=1* and *Y=Unchanged; Y=0*.

From the total of 623 students in the sample, about 25% of them (159 students) change their intention. The remaining majority of the students do not differ between their initial and current intention.

Table 1: Descriptive Statistics

	Binary dependent variable		
	Unchanged	Changed	Total
Continuous variables			
Age	24.5	24.7	-
Stay duration in NZ	2.6	3.1	-
Years of work experience	1.4	1.1	-
Demographic and socio-economic variables			
Single	418 (74.6)	142 (25.4)	560 (89.9)
Male	232 (77.9)	66 (22.1)	298 (47.8)
Initially intending to return home	195 (80.6)	47 (19.4)	242 (38.8)
Supportive family	216 (71.5)	86 (28.5)	302 (48.5)
Tertiary educated father	293 (72.4)	112 (27.6)	405 (65.0)
Education-related variables			
PhD	106 (68.8)	48 (31.2)	154 (24.7)
Previously educated abroad	205 (73.2)	75 (26.8)	280 (44.9)
Science*	181 (77.0)	54 (23.0)	235 (37.7)
Health science	72 (64.9)	39 (35.1)	111 (17.8)
Humanities	99 (78.0)	28 (22.0)	127 (20.4)
Commerce	112 (74.7)	38 (25.3)	150 (24.1)
Home country perception-related variables			
Good work environment	117 (82.4)	25 (17.6)	142 (22.8)
Good family/social ties	344 (74.3)	119 (25.7)	463 (74.3)
Good racial relations	173 (76.6)	53 (23.4)	226 (36.3)
Good & competitive wage	180 (77.9)	51 (22.1)	231 (37.1)
Good knowledge use opportunity	138 (80.7)	33 (19.3)	171 (27.4)
Good quality of life	134 (79.8)	34 (20.2)	168 (27.0)
Total	464 (74.5)	159 (25.5)	623 (100.0)

Note:

1. Mean figures, in years, for the three continuous variables. Following Waldorf (1995) and Simmons (1986), the three continuous variables can also be regarded as time-related variables.
2. * Science is the comparison group for the disciplines of study.
3. *n*(%)

Three features stand out from Table 1. The first one pertains to the stay duration in New Zealand. The students who changed their intention have, on average, stayed in New Zealand for slightly more than 3 years.

Those who have not changed their intention have, on average, only stayed in New Zealand for about 2½ years. This simple statistic seems to support the intuition that the longer one stays in a host country, the likelier one is to change intention. The second outstanding feature from the table pertains to the health science discipline. Students from this discipline, compared with students from other disciplines, constitute the largest proportion of those who changed their intention. About 35% of health science students change intention. The third distinct feature pertains to students whose intentions are unchanged. The largest proportion of students who do not change their intention are those who initially intend to return (80.6%), those who have good perceptions about the home working environment (82.4%), and those who have good perceptions on home knowledge use opportunities (80.7%).

3.2 Marginal Effects

Apart from examining the effect of a change in the explanatory variables on the odds between two outcomes, one can also look at the effect of a change in the explanatory variables on the outcome probability. The marginal effects shown in Table 2 are evaluated at mean values of continuous variables and at modal values of dummy variables. As for any nonlinear models, the actual magnitude of the marginal effects varies with different points of evaluation (Cameron & Trivedi, 2005, p. 465). This qualification has to be taken into consideration when interpreting the marginal effects.

Two education-related variables, being a doctoral student and being in the health science discipline, have the largest marginal effect magnitudes among all the explanatory variables. The probability of an intention change for a doctoral student is about 12% higher than that of a non-doctoral student, ceteris paribus. The probability of an intention change for a health science student, compared to a science student, is about 14% higher, ceteris paribus. Table 2 also shows that when a student has good perceptions on the different aspects of his home country, his probability of changing his intention decreases. The only exception is the perception on family ties and network of friends at home, where a good perception on this aspect of home increases his probability of an intention change.

Table 2: Marginal Effects

	dy/dx	s.e.
Age	0.0020	0.0076
Single	-0.0163	0.0844
Male	-0.0893**	0.0451
Stay duration in NZ	0.0327**	0.0135
Years of work experience	-0.0096	0.0125
PhD	0.1237*	0.0672
Previously educated abroad	-0.0310	0.0521
Health science	0.1352**	0.0658
Humanities	-0.0059	0.0671
Commerce	0.0582	0.0630
Initially intending to return home	-0.1052**	0.0461
Supportive family	0.0434	0.0467
Tertiary educated father	0.0763†	0.0468
Good work environment	-0.0768	0.0576
Good & competitive wage	-0.0423	0.0506
Good knowledge use opportunity	-0.0681	0.0531
Good quality of life	-0.0515	0.0529
Good family/social ties	0.0809	0.0515
Good racial relations	-0.0454	0.0495

Note:

1. † Significant at 10.4% level.
2. Significant at the ***1%, **5%, and *10% level.
3. In binary logit models, the sign of the marginal effect is given by the sign of the binary regression coefficient.

However, the marginal effects of all the perception-related variables on the outcome probabilities are insignificant. How the students perceive different aspects of either their home or host country does not seem to influence whether or not the students change their intention. This is a somewhat unexpected finding, as it has been expected that such perceptions would influence intention change. The other variables having significant marginal effects on the outcome probabilities are years of stay in New Zealand, gender, initial intention, and socioeconomic background. The longer a student stays in New Zealand, the likelier he is to change his intention. Having stayed another year in New Zealand increases the probability of an intention change by about 3%, ceteris paribus.

The results from the stay duration variable are consistent with what Jayme (1982) found – a longer stay duration changes one's return intention. A male student has a probability of about 9% lower than a female student of changing his intention.

A student who initially intends to return home, has a probability of about 11% lower in changing his intention than a student whose initial intention is otherwise. Also note that a student who comes from a good socioeconomic background, as proxied by tertiary educated father, has a probability of about 8% lower in changing his intention, ceteris paribus. The marginal effects measure in this section is more appropriate for the purpose of generalizing the findings. However, if interest lies in how an outcome probability changes due to changes in some pertinent variables, then the discrete changes measure is more appropriate. Discrete changes in selected variables of interest are depicted in hypothetical scenarios as explained in the following section.

3.3 Hypothetical Scenarios of Discrete Changes

Apart from examining by how much an outcome probability changes, as in the previous section, it may be of more substantive interest to see what the outcome probabilities are, when selected variables change by a certain discrete amount. Changes in a variable or a subset of variables are depicted in the different scenarios as in Table 3. Each scenario can be thought of as representing a hypothetical student with some specified characteristics.

Scenario 1 is the baseline scenario, set at mean values of continuous variables and at modal values of dummy variables. A hypothetical student with the characteristics as in Scenario 1 has a probability of about 0.63 in not changing her intention. The outcome probabilities in this scenario serve as the benchmark probabilities against which probabilities from other scenarios can be compared. Scenario 2 depicts a student who has good perceptions on every aspect of her home country. Her probability of not changing her intention increases from 0.6274 to 0.8563, a 36% increase. On the other hand, her probability of changing her intention decreases from 0.3726 to 0.1437, a 61% drop. The 36% increase and 61% drop suggest that the effects of such favourable perceptions on the two outcome probabilities are substantial. However, if we only look at the marginal effects of the perception-related variables (i.e., insignificant and relatively small magnitude) as in Table 3, we may miss out on the importance of the perception-related variables as shown here.

Table 3: Hypothetical Scenarios of Marginal Effects on Outcome Probabilities

	Scenarios					
	1	2	3	4	5	6
Age	mean					35
Single	1					0
Male	0				1	1
Stay duration in NZ	mean				5	
Years of work experience	mean				0	5
PhD	0				1	1
Previously educated abroad	0					1
Health science	0				1	
Humanities	0					
Commerce	0					
Initially intending to return home	0			1		
Supportive family	0					
Tertiary educated father	1					
Good work environment	0	1	0			
Good family/social ties	1	1	0			
Good racial relations	0	1	0			
Good & competitive wage	0	1	0			
Good knowledge use opportunity	0	1	0			
Good quality of life	0	1	0			
Outcome probabilities						
Prob(Y=Changed)	0.3726	0.1437	0.2918	0.2675	0.6227	0.3661
Prob(Y=Unchanged)	0.6274	0.8563	0.7082	0.7325	0.3773	0.6339

Note:

1. Scenario 1 is the baseline scenario, where the predicted outcome probabilities are computed holding continuous variables at mean values and dummy variables at modal values.
2. Changes in other hypothetical scenarios are relative to the baseline scenario.

On the contrary, in Scenario 3, when a student has only unfavourable perceptions on all the six aspects of her home country, the changes in outcome probabilities are not as drastic as that of Scenario 2. Her probability of having a change of intention decreases from 0.3726 to 0.2918, a 22% drop, whereas her probability of not changing her intention increases from 0.6274 to 0.7082 which is a 13% increase. Scenario 2 and 3 suggest that good perceptions of one's home country have larger impacts on an intention change than less favourable perceptions. Scenario 4 depicts a student whose initial intention is to return home, with all her other characteristics the same as in the baseline scenario.

For such a student, her probability of an unchanged intention increases from 0.6274 to 0.7325, a 17% increase. When compared to Scenario 3, we notice that a change in this sole variable has a larger impact on the outcome probabilities than changes in all the six perception-related variables, i.e., a 17% versus a 13% increase.

The scenarios discussed so far have a common trait in that the probability of an intention change decreases from that of the base scenario, and the probability of an unchanged intention increases from that of the base scenario. Scenario 5 is different in this sense. Scenario 5 depicts a health science doctoral male student who has no working experience whatsoever and has been staying in New Zealand for five years. This scenario is typical of students who continue their doctoral studies straight from their honours degree in New Zealand universities. For such a student, his probability of having a change of intention increases from 0.3726 to 0.6227, a 67% increase. His probability of not changing his intention decreases from 0.6274 to 0.3773, which is a 40% drop. This suggests that a student with the characteristics specified in this scenario, is very prone to changing his intention.

Scenario 6 depicts a student who is very different from the typical student described in Scenario 5. Scenario 6 depicts a middle-aged married male student who has been working for five years prior to taking up his current doctoral studies in New Zealand. He is also considered mobile, having been abroad before for his previous education. The outcome probabilities in this scenario are almost opposite mirror images of those in Scenario 5. Such a student depicted in Scenario 6 is less likely to change his intention compared to the hypothetical student in Scenario 5, i.e., *0.3661* < *0.6227*.

3.4 Model Specification Tests

Having examined the results, here we now look at how well the binary logit model fits the data. The model's goodness-of-fit or specification is assessed through the following tests and diagnostic statistics, as shown in Table 4. The likelihood ratio chi-squared (LR χ^2) test is a test of overall goodness-of-fit of the model. It tests for the null hypothesis that all the coefficients of the explanatory variables in the model are simultaneously equal to zero. The null hypothesis is strongly rejected.

Table 4: Model Specification Tests

Specification tests	Results
Likelihood ratio chi-squared test	p-value = 0.0005
General model specification test	p-value = 0.9160
Restriction test (on insignificant variables)	p-value = 0.3390
Homoskedasticity test	p-value = 0.3422
Exogeneity test	
i. Stay duration	p-value = 0.7981
ii. Initial return intention	p-value = 0.7927
Percent correctly predicted (PCP)	PCP = 74.64%

The general model specification test, also known as a link test, tests for the appropriate specification of the model. This test is based on the idea that if the model is properly specified, then there should be no additional explanatory variables that are significant except by chance. The test uses the predicted value (*hat*) and the squared of the predicted value (*hatsq*) as explanatory variables. The '*hatsq*' variable is treated as the additional explanatory variable. The '*hatsq*' variable is found insignificant with a p-value of 0.916, indicating the appropriate specification of the model. The restriction test tests for the presence of multicollinearity among the explanatory variables. Insignificant individual tests, but a significant joint test is a symptom of multicollinearity (Gujarati, 2003, p. 359). The test restricts the coefficients of individually insignificant explanatory variables to be jointly zero. At a p-value of 0.3390, the restriction test is insignificant, suggesting minimal multicollinearity. Furthermore, no individual variance inflation factor (VIF) is more than 10, and the average VIF is at 1.42.

Heteroskedastic error term leads to inconsistent parameter estimates, hence it is important to check for it. Homoskedasticity of errors is tested by fitting a heteroskedastic probit model, allowing for the possibility of heteroskedasticity in four variables – age, residence years in New Zealand, years of work experience, and level of study. No statistical evidence of heteroskedasticity is found, with a p-value of 0.3422, i.e., the null hypothesis of a homoskedastic model is not rejected.

Two explanatory variables, stay duration in New Zealand and initial return intention, may exhibit potential endogeneity with the dependent variable.

Although good valid instruments are hard to come by, nevertheless the two variables are tested for endogeneity. Using Smith and Blundell's (1986) exogeneity test, the two variables are found to be statistically exogenous. Their insignificant p-values do not reject the null hypothesis that the model is appropriately specified with exogenous explanatory variables. The statistical evidence suggests that the endogeneity problem arising from the two variables should be minimal.

Another way to assess the model's goodness-of-fit is through the model's ability in discriminating among the outcomes of the dependent variable; to see if the model can accurately classify the outcomes. The percent correctly predicted statistic of 74.64% means that the model correctly classifies about 75% of the outcomes. This statistic suggests that the model has an acceptable level of predictive power or discriminating ability. A normality of residual test, where the residual is an estimate of the error term of the model, is invalid for the binary logit model. This is because such a normality of residual test is based on the assumption that the residual is continuous. This is not the case for the binary logit model. In binary logit models, the error term is not assumed to be normally distributed, but to follow a binomial distribution, where this binomial distribution will only approximate a normal distribution for large samples (Menard, 1995, pp. 72-73).

3.5 Robustness Check

The specification tests suggest that the binary logit model used here should be specified adequately, but we also need the model to be robust. In a robust model, the main conclusions pertaining to the sign and significance of key variables should hold, even when subjected to different specifications (i.e., inclusion or exclusion of a subset of variables, or use of different models). In Table 5, M1 represents the primary model, which is the current binary logit model. This model is compared with five other model specifications. M1 is first compared to M2, its binary probit counterpart. All the coefficient signs and levels of significance are the same, except for the father's education variable which is significant in M2 at the 10% level (i.e., with a p-value of 0.091). In M1, this variable is marginally significant with a p-value of 0.102.

The M3 logit specification excludes the six perception-related variables. Their exclusion does not alter any of the signs or significance level, except for the years of residence in New Zealand variable, which is now significant at the 5% level. Both the logit coefficients of M1 and M3 have comparable magnitudes.

The M4 logit specification includes a set of three interaction variables, where the level of study is interacted with the discipline of study. In this specification, the level of study (i.e., the 'PhD' variable) becomes insignificant, while one of the interaction term becomes marginally significant with a p-value of 0.094. However, the set of interaction terms is excluded from the primary model since there is no strong theoretical basis for their inclusion.

Table 5: Model Robustness Check

	Different specifications					
	M1	M2	M3	M4	M5	M6
Age	0.0087	0.0050	0.0104	0.0186	-0.0367	0.0013
Single	-0.0692	-0.0554	-0.1282	-0.0684	-0.0243	-0.0159
Male	-0.4072**	-0.2439**	-0.4316**	-0.3873*	-0.3952**	-0.0723**
Stay duration in NZ	0.1398***	0.0809***	0.1094**	0.1516***	0.3304**	0.0258***
Years of work experience	-0.0411	-0.0219	-0.0440	-0.0441	0.0957	-0.0059
PhD	0.5064*	0.2895*	0.4960*	0.5595	0.4235	0.0927*
Previously educated abroad	-0.1351	-0.0676	-0.1338	-0.1298	-0.1376	-0.0253
Health science	0.5521**	0.3202**	0.6110**	0.5686*	0.5165*	0.1059**
Humanities	-0.0252	-0.0226	-0.0691	0.2267	-0.0472	-0.0035
Commerce	0.2425	0.1319	0.1921	0.1648	0.2094	0.0388
Initially intending to return home	-0.4867**	-0.2829**	-0.5102**	-0.5180**	-0.4868**	-0.0820**
Supportive family	0.1817	0.1054	0.2312	0.1746	0.1823	0.0324
Tertiary educated father	0.3437	0.2076*	0.2957	0.3653*	0.3205	0.0587
Good work environment	-0.3464	-0.1916		-0.3325	-0.3683	-0.0539
Good & competitive wage	-0.1857	-0.1108		-0.1827	-0.1649	-0.0323
Good knowledge use opportunity	-0.3047	-0.1920		-0.2903	-0.3445	-0.0499
Good quality of life	-0.2275	-0.1518		-0.2377	-0.2301	-0.0398
Good family/social ties	0.3659	0.1940		0.3851	0.3696	0.0666
Good racial relations	-0.1998	-0.1094		-0.2090	-0.2226	-0.0358
PhD*Health science				0.0132		
PhD*Humanities				-1.1939*		
PhD*Commerce				0.3017		
(Age)^2					0.0007	
(Stay duration in NZ)^2					-0.0229	
(Years of work experience)^2					-0.0109	

Note: Significant at the *10%, **5%, and ***1% level.

Three squared terms are included in the M5 logit specification. The three squared terms are the squared version of the three continuous variables – age, years of residence in New Zealand, and years of work experience. None of the squared terms is found to be significant. The coefficient signs hold, with some marginal changes in the significance level for a few variables. The results from M5 suggest no existence of nonlinearities pertaining to the three continuous variables. This M5 specification also provides empirical evidence to support the exclusion of squared term from the primary model. The final specification, M6, is a linear probability model (LPM). Although the discrete nature of the dependent variable does not permit the legitimate use of the LPM, the model is typically used in empirical work to provide a quick feel of the results. It is more of an exploratory tool (Cameron & Trivedi 2005, p. 471). None of the coefficient signs or significance level differs between M1 and M6. It is only advisable though, to use the LPM if the data fall in the linear region of the probability curve.

4.0 Conclusion

Using a binary logit model, this paper specifically addresses the change or non-change of return intention as its main research question, rather than the more typical issue of whether or not a student returns home. The empirical findings from this paper add to the sparse literature of intention change. Three-fourths of the students in the sample do not change their intention. Doctoral students and students from the health science discipline are found to be more likely to change their intention. The longer a student stays in New Zealand, the likelier he is to change his intention as well. On the other hand, male students are less likely to change their intention. So are the students whose initial intentions are to return. Surprisingly, no perception-related variables are significant in terms of their marginal effect on intention change. The specified model also has been considerably justified in terms of goodness-of-fit and robustness.

Ideally, a panel regression model should have been estimated. But in order to that, we would need data on the students' initial intention prior to their coming to New Zealand. Since the gathering of such data would be infeasible, hence such a model is not pursued any further. In light of the impracticality of such a panel dataset, a possible future avenue of research is to incorporate random coefficients to account for the change of intention due to time variations. There are still many avenues left to be explored regarding why students change or not change their return intention. One of the avenues worth following pertains to Portes's (1976) and Hall's (2005) question.

In a similar vein with their question, the current findings perhaps give rise to the question of not why students changed their intention, but why many of them did change their intention.

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