

The Impact of Study Abroad Programmes on Graduate Employment Outcomes: A Propensity Score Matching Analysis

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Abstract

By merging a dataset that contains information about undergraduates' participation in study abroad programmes (SAP) during the period 2007-2013 while in the National University of Singapore (NUS) with the self-reported outcomes in the Graduate Employment Survey (GES), we examine the impact of study abroad programmes on three outcomes, namely, (1) the salary of graduates' first job upon graduation, (2) their job search duration and (3) their academic performance at graduation.

Using Propensity Score Matching, we find that participation in SAP increased the monthly salary of their first job by an average of S\$190.40. The impact is particularly pronounced for students with graduating Cumulative Average Point (CAP) above 4.5 (+S\$445.24) and between 3.5 - 4.0 (+S\$194.12) but is moderate for students with CAP between 4.0 and 4.5 (S\$159.83). Across the faculties and schools, SAP increased the graduates' monthly salary for Business, Arts and Social Sciences, and Science by S\$480.90, S\$252.10 and S\$267.80 respectively. Participants in NUS Overseas College (NOC), NOC (Singapore), Student Exchange Programme (SEP) and summer/winter programme also had salaries higher by S\$690.70, S\$315.90, S\$213.90 and S\$110.00 respectively. SAP destinations that increased graduates' monthly salary include USA (+S\$400.50), China (+S\$365.70) and UK (+S\$228.30). The impact on job search duration is generally insignificant. Overall, participation in SAP increased graduates' academic performance, defined as graduating CAP, by 0.041. Despite being statistically significant, the magnitude is rather moderate.

Keywords: Globalisation ♦ Study abroad programme ♦ Employment outcomes ♦ Propensity Score Matching

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Introduction

Study abroad programmes (SAP) generally refer to negotiated arrangements between institutions of higher education in two or more countries which provide students an opportunity to study at the partner institution, the duration of which may range from a few weeks to a year. Over the past decade, SAP for undergraduates has been a key initiative in universities all over the world. In fulfilling its vision to be a global university centered in Asia, the National University of Singapore (NUS) has, through strategic collaborations with global partners and active participation in global networks, been offering a suite of distinctive global programmes that encompasses education, research and entrepreneurship with the aim to develop students into global citizens who understand the world and embrace diversity. Since 2014, at least 80% of NUS undergraduates enjoy an overseas experience as an undergraduate.

NUS adopts a multi-prong approach in her internationalisation strategy where not only does NUS bring the students to the world, she also brings the world to NUS.

Bringing Students to the World

Programmes that bring our students to the world include the Student Exchange Programme (SEP) where undergraduates spend at least one semester in an overseas partner university and the NUS Overseas College (NOC), an overseas entrepreneurship programme. Some students also participate in summer/winter programmes offered by other institutions.

Student Exchange Programme (SEP)

NUS started its internationalisation journey with its flagship student mobility program – the Student Exchange Programme (SEP). Since its beginnings in 1994, SEP has expanded in scale and improved in quality, sending about 2,000 students and receiving an equal number of overseas students in the recent academic year 2014/2015. NUS now has reciprocal student exchange arrangements with over 300 top universities in 50 countries.

NUS Overseas College (NOC)

In 2002, NUS launched the NUS Overseas College (NOC) programme – an innovative entrepreneurial education programme where students intern full time in a startup and take part-time courses in a partner university. The NOC programme is now located in nine leading entrepreneurial hotspots across the globe - Beijing, Israel, Lausanne, Munich, New York, Shanghai, Silicon Valley and Stockholm. Most programmes are year-long, giving students the opportunity to interact with startup founders, angel investors and other inspiring role models to learn the ropes of their entrepreneurial success.

Within the NOC umbrella is also the NOC Singapore programme, which is a local entrepreneurship development programme with a regional perspective. Students in this programme go on a seven-month internship with a start-up or high-growth company based in Singapore but with a regional footprint, followed by a two-week Overseas Study Mission. The study mission aims to expose participants to overseas entrepreneurial ecosystems and start-up cultures via an intensive programme of networking sessions, company visits and interactions with entrepreneurs.

Bringing the World to NUS

In addition to providing overseas experience to the undergraduates, NUS also offers a globalized campus in Singapore with several strategic initiatives on campus such as the Duke-NUS Medical School, the Yale-NUS College and the NUS University Town. In 2010, NUS set up its first overseas institute, the NUS Suzhou Research Institute (NUSRI) in China. Details of these initiatives can be found in Annex 1.

In this paper, we seek to offer evidence on the merits of SAP, or lack of by merging a dataset that contains information about undergraduates' participation in study abroad programmes (SAP) during the period 2007-2013 while in NUS with their self-reported outcomes in the Graduate Employment Survey (GES).

Literature Review

A review of the literature on SAP identifies several streams of research. As one of the first papers on SAP, Teichler and Stebube (1991) compares different models and approaches to SAP. As SAP gained popularity, the literature on the impact of internationalisation (Altbach and Teichler 2001; Altbach and Knight

2007; Bartell 2003; Long 2012; McCabe 2001) and study abroad programmes (Altbach and Knight 2007; Anderson and Lawton 2011; Paige, Fry, Stallman, Josic and Jon 2009; Soria and Troisi 2014) increased. Dwyer (2004), Ingraham and Peterson (2004), Paige et al. (2009) and Stronkhorst (2005) examined a basket of outcomes arising from participation in SAPs, namely civic engagement, educational decision, intellectual growth, intercultural growth and career impacts. Other studies focus on the specific outcomes of intercultural competencies (Anderson, Lawton, Rexeisen and Hubbard 2006; Anderson and Lawton 2011; Jackson 2011; Root and Ngampornchai 2012; Williams 2006) or global awareness/mindedness (Kehl and Morris 2007; Kurt, Olitsky and Geis 2013; Tarrant, Rubin and Stoner 2014). While employability or impact on career is part of a wider basket of outcomes listed in the studies above, there have been few studies looking directly at employability as a specific outcome. Using a survey for students to self-assess the impact of SAP on their career plans, Orahood, Kruze and Pearson (2004) suggested that “using current literature, career-related outcomes particular to programs designed for business students may be derived only loosely”. It is also worthy to note that many studies had small sample sizes (Anderson et al. 2006; Anderson and Lawton 2011; Jackson 2011; Kurt et al. 2013; Lee, Therriault and Linderholm 2012; Root and Ngampornchai 2012; Stronkhorst 2005; Williams 2006). Furthermore, most empirical studies face a common criticism of selection bias. That is, the underlying characteristics of individuals who participated in SAP may potentially differ systematically from those who did not and thus the measured outcomes for individuals in these programmes could then be due to the sample obtained that is not representative of the population. Put differently, the possibility of bias arises because the apparent difference in outcome between these two groups of individuals may depend on the characteristics that affected whether or not he or she participated in SAP instead of due to the effect of SAP participation per se. As a result, any analysis of the impact of SAP must account for systematic differences in the underlying characteristics between SAP and non-SAP individuals when estimating the effect of SAP on outcomes.

This study aims to fill the gap in existing literature in two aspects. Firstly, this paper focuses on graduate employability outcome, an outcome that has not been thoroughly looked into, by analysing a large dataset (sample size more than 3,000) obtained by merging two existing datasets of several cohorts of alumni of NUS who were undergraduates during the period 2007-2013. One dataset provides demographic information and information on university admission score (UAS), academic performance, defined as Cumulative Average Point (CAP)¹ at graduation, field of study, financial aid (FA) received and the type of SAP participated in, if any. The second data set is obtained from the Graduate Employment Survey (GES) conducted over a three-month window and is mailed to students three months after their graduation. The second dataset provides information on the employment status, starting monthly gross salary, date at the start of job search and the date when the first job offer is received, from which the duration of job search is obtained. We matched the post-graduation survey data to an individual’s information provided in the first dataset. The merged dataset captures almost all of the individual’s activities while he/she was in the university. It is worth emphasising that with a sample size of more than 3,000, this is by far the largest quantitative SAP impact study conducted. Secondly, we use propensity score matching (PSM) to account for the selection into SAP. PSM is a commonly adopted statistical method to account for selection bias as it assumes a nonparametric relation between an individual’s treatment status, in this case, SAP participation, and the outcomes of interest. More specifically, we use the unique selection of variables in the dataset to estimate the propensity score specification for each individual so that the participation in SAP is a function of the individual’s (observed) background information. PSM therefore accounts for selection bias by comparing those who have participated in SAP (henceforth referred to as “SAP” Group) to those who have not (henceforth referred to as “non-SAP” Group) within the group of individuals with similar estimated probability of participating in SAP when in NUS.

The purpose of this study is to estimate the impact of SAP along three outcomes, namely, (1) monthly gross salary of first job after graduation, (2) duration of job search before receiving the first job offer, and (3) academic performance, defined as the CAP at graduation here. This is the only study, to our knowledge, to examine the impact of SAP after controlling for individual characteristics and for SAP selection.

Using Propensity Score Matching and an average salary of S\$3,207 in the data, we find that participation in SAP increased the monthly salary of their first job by an average of S\$190.40.² The impact is particularly pronounced for students with graduating Cumulative Average Point (CAP) above 4.5 (+S\$445.24) and between 3.5 - 4.0 (+194.12) but is moderate for students with CAP between 4.0 and 4.5 (+159.83). Across the faculties and schools, SAP increased the graduates’ monthly salary for Business, Arts and Social Sciences,

¹ In NUS, we use the Cumulative Average Point (CAP) that is bounded above by 5.0, instead of the Grade Point Average, to denote the academic performance of the students. For this paper, the CAP will be used.

² US\$1 is approximately S\$1.44 (21 December 2016).

and Science by S\$480.90, S\$252.10 and S\$267.80 respectively. Participants in NOC and NOC (Singapore) also had salaries higher by S\$690.70 and S\$315.90 respectively. SEP and summer/winter programmes register a lower impact of +S\$213.90 and +S\$110.00. SAP destinations that increased graduates' monthly salary include USA (+S\$400.50), China (+S\$365.70) and UK (+S\$228.30). The impact on job search duration is generally insignificant. Overall, participation in SAP increased graduates' academic performance, defined as graduating CAP, by 0.041. Despite being statistically significant, the magnitude is rather moderate.

Data

Sample Description

The first dataset contains information about 5,095 NUS graduates from School of Business (BIZ), School of Computing (SoC), Faculty of Arts and Social Sciences (FASS), Faculty of Engineering (FoE), Faculty of Science (FoS) and School of Design and Environment (SDE) during the period 2007-2013 (Tables 1-3).³

Table 1 Number of Observations in Undergraduate Dataset

No. of students	5,095
No. of single degree students	5,010
No. of double degree students	85
No. of degrees conferred	5,180

In Table 2, we observe that about 40% of students in the dataset participated in SAP, with female students having a slightly higher participation rate of 42%.⁴ Singapore citizens (SG-Citizen) also had a higher participation rate at 42% than non-Singapore citizens. Citizenship groups with the highest rate of participation are China, Singapore and Indonesia. Across ethnic groups, 43.56% of Chinese students participated in SAP, the highest among all ethnic groups. Business students were most active in SAP, with at least 2 out of 3 students (68.24%) having had participated before graduation.

Table 2 Tabulation of Student Characteristics (I)

		Total	SAP		Non-SAP	
			Freq.	%	Freq.	%
Gender	Male	2,420	1,029	42.52	1,391	57.48
	Female	2,675	1,163	43.48	1,512	56.52
Residency	International	1,040	394	37.88	646	62.12
	SG-Citizen	3,784	1,675	44.27	2,109	55.73
	SG-PR	271	123	45.39	148	54.61
Citizenship	China	556	262	47.12	294	52.88
	India	92	26	28.26	66	71.74
	Indonesia	133	57	42.86	76	57.14
	Malaysia	314	105	33.44	209	66.56
	Singapore	3,784	1,675	44.27	2,109	55.73
	Vietnam	100	28	28.00	72	72.00
	Others/Unknown	116	39	33.62	77	66.38
Ethnicity	Chinese	4,430	1,998	45.10	2,432	54.90
	European	18	6	33.33	12	66.67
	Indian	225	70	31.11	155	68.89
	Malay	141	33	23.40	108	76.60
	Sikhs	6	2	33.33	4	66.67
	Others	275	83	30.18	192	69.82
Faculty*	BIZ	551	376	68.24	175	31.76
	SoC	305	97	31.80	208	68.20
	FASS	1,394	524	40.46	830	59.54

³ Students from Yong Siew Toh School of Music, Faculty of Dentistry and Faculty of Law are excluded either due to small sample sizes or the GES is conducted separately and at different times.

⁴ As the dataset captures undergraduates before 2014, SAP participation is lower than 80%.

	FoE	1,280	470	41.09	754	58.91
	FoS	1,169	159	40.21	699	59.85
	SDE	396	217	40.15	237	69.48
Academic Programme	B.A.	711	217	30.52	494	69.48
	B.Soc. Sci.	683	347	50.81	336	49.19
	B.B.A.	551	376	68.24	175	31.76
	B.Comp.	305	97	31.80	208	68.20
	B.A. (SDE)	148	84	56.75	64	43.24
	B.Sc. (SDE)	248	75	30.24	173	69.76
	B.Eng.	1,280	526	41.09	754	58.91
	B.ASc.	56	18	32.14	38	67.86
	B.Sc.	962	406	42.40	556	57.80
	B.Sc. (Phar)	151	46	41.35	105	58.65
	Total	5,095	2,192	43.02	2,903	56.98

* BIZ - Business, , SoC = School of Computing, FASS – Faculty of Arts and Social Science, FoE - Faculty of Engineering, FoS - Faculty of Science, SDE - School of Design and Environment.

In Table 3, we note that the proportion of participation increases steadily from 1.94% to 69.43% as graduating CAP increases from “<2.5” to “>4.5”. This shows that academically stronger students have a higher SAP participation rate. This is partially attributed to the SAP selection and scholarship award process that often include having a good CAP as a criterion. This further reinforces the need to address selection bias in the analysis of the impact of SAP.

Table 3 Tabulation of Student Characteristics (II)

Graduating CAP	Total	By SAP Participation		By Faculty					
		SAP (%)	Non-SAP (%)	BIZ	FASS	FoE	FoS	SDE	SoC
<2.5		2	101						
	103	(1.94)	(98.06)	5	17	31	36	1	13
2.5-3.0		40	308						
	348	(11.49)	(88.51)	26	70	115	85	20	32
3.0-3.5		259	729						
	1988	(13.03)	(36.67)	124	287	234	196	101	46
3.5-4.0		678	958						
	1636	(41.44)	(58.56)	174	465	392	326	177	102
4.0-4.5		886	663						
	1549	(57.20)	(42.80)	185	455	364	375	83	87
>4.5		327	144						
	471	(69.43)	(30.57)	37	100	144	151	14	25
Total	5,095	2192	2903	551	1394	1486	1169	396	305

Graduate Employment Survey (GES)

The Graduate Employment Survey (GES) is stipulated by the Ministry of Education, Singapore (MOE). It is mailed every November to all the students who graduated that year in July. The time window of the survey is from November to January. The overall response rates to date have typically been close to 70%, a minimum requirement set by MOE.

In the GES dataset, 3,131 individuals reported to be employed and reported their monthly gross salary while 2,757 reported their employment status and the time at the start of their job search and the time they received their first offer (if any), from which the search duration is calculated (Table 4).

From Table 4, it is observed that individuals with SAP experiences on average have higher university admission scores (71.42 versus 66.79), higher CAP upon graduation (4.0 versus 3.59), a higher probability of holding an honors degree (0.84 versus 0.62), and receive more financial aid. Moreover, for those working after graduation, individuals with SAP experiences tend to report higher salary (S\$3,366 versus S\$3,094) but slightly

longer duration of job search (3.14 months versus 2.78 months). However, such differences may not be the effect of SAP experiences but other factors that increase both the individual's salary and his likelihood of participating in SAP. As alluded to earlier, the possibility of bias arises because the apparent difference in outcomes between individuals with and without SAP participation may depend on characteristics that affected whether or not the individuals participated in SAP instead of due to the effect of having participated in SAP.⁵

Table 4 Summary of Statistics from GES

	Count	Mean	Min	Max
<i>Panel A: Total</i>				
Salary (monthly, in SGD)	3,131	3,207	200	15,000
Search duration (months)	2,757	2.93	0	36
CAP upon Graduation	5,301	3.76	2	5
University Admission Score (UAS)	5,260	68.72	0	100
Honors Degree (1 if Yes)	5,095	0.71	0	1
No. of times of Financial Aid (FA)**	5,095	8.91	0	49
Amount of Financial Aid (FA) (in S\$)	5,095	9,095	0	56,912
<i>Panel B: SAP</i>				
Salary (monthly, in SGD)	1,304	3,366	300	10,300
Search duration (months)	1,117	3.14	0	36
CAP upon Graduation	2,192	4	2.1	5
University Admission Score (UAS)	2,192	71.42	0	100
Honors Degree (1 if Yes)	2,192	0.84	0	1
No. of Times of Financial Aid (FA)**	2,192	8.61	0	46
Amount of Financial Aid (FA) (in S\$)	2,192	9,713	0	56,912
<i>Panel C: Non-SAP</i>				
Salary (monthly, in SGD)	1,827	3,094	200	15,000
Search duration (months)	1,640	2.78	0	34
CAP upon Graduation	3,109	3.59	2	4.92
University Admission Score (UAS)	3,068	66.79	0	100
Honors Degree (1 if Yes)	3,109	0.62	0	1
No. of times of Financial Aid (FA)**	3,109	9.12	0	49
Amount of Financial Aid (FA) (in S\$)	3,109	8,659	0	54,890

**The number of times of receipt of financial aid is counted on a per term basis if the financial aid is given on a term-basis. For example, a student receiving bursary for one academic year would be counted as having 4 tranches of financial aid. Students on double degree programmes can receive a large number of financial aid tranches owing to the longer duration in university.

Table 5 summarises the profile of participants across the different SAP programmes. Notably, the reported salary of participants in NOC and NOC (Singapore) are higher than the other programmes. Participants of "Local" programme also reported relatively high salaries. In the classification of programme types, "Local" refers to all programmes in Singapore and includes exchange, summer/winter programmes and research or coursework programs at another university in Singapore. It is worthwhile to note that more than one third of students in this group are international, with more than half of them from the science and arts and social sciences. These students also have relatively high graduation CAP (4.27) with 93.9% of them graduating with an honours degree. Yet, their average UAS score is relatively low.⁶ All these point to a group of academically strong international students. Such a profile might explain why their average salary is also higher than those who participated in other programme types. In terms of gender difference, more female students participated in overseas summer/winter programmes (SWP), most of whom are either from Arts and Social Sciences, or from Science. On the other hand, more male students participated in NOC and NOC (Singapore), with a majority of them from Engineering.

⁵ These observations are not tested for statistical significance. More rigorous analyses based on Propensity Score Matching are conducted and reported in the later part of the paper.

⁶ Some international students who enroll in NUS do not have UAS and may have sat for entrance examinations instead.

Table 5 Summary of Statistics by SAP Programme Type

Type (Count)	SEP (1604)	SWP (555)	NOC (87)	Local (66)	NOC (Singapore) (41)
Salary (S\$)	3,441.1	3,108.2	3,816.1	3,698.3	3,669.2
Gender (F)	50.20%	69.50%	34.50%	42.40%	41.50%
UAS	69.94	77.37	73.69	53.71	71.18
1st Year CAP	4.03	3.78	3.64	4.34	3.79
CAP upon Graduation	4.06	3.88	3.79	4.27	3.86
Honours	88.40%	75.90%	70.10%	93.90%	80.50%
No. of times of FA	8.74	8.27	8.92	9.35	11.73
Amount of FA	S\$10,208	S\$8,708	S\$7,598	S\$10,547	S\$10,460
Faculty					
BIZ	20.40%	11.50%	18.40%	9.10%	14.60%
FASS	23.30%	31.50%	25.30%	28.80%	14.60%
FoE	25.90%	16.00%	39.10%	19.70%	34.10%
FoS	17.60%	34.10%	6.90%	24.20%	19.50%
SDE	8.80%	4.00%	0.00%	3.00%	4.90%
SoC	4.00%	2.90%	10.30%	15.20%	12.20%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
International	19.80%	11.00%	14.90%	36.40%	36.60%
SG Citizen	74.10%	83.20%	85.10%	59.10%	61.00%
PR	6.10%	5.80%	0.00%	4.50%	2.40%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

From Table 6, we observe that among all SAP destinations, USA has the most participants of 409, with Korea and Canada a distant second and third, followed closely by European destinations (Germany, UK and Sweden). A further breakdown across faculties shows that business students constitute the largest group of participants in China while engineering students are the largest group in Germany.

Table 6 Summary of Statistics by SAP Destination

Country (Count)	Canada (212)	China (127)	Germany (168)	UK (168)	HK (98)	Korea (244)	SGP (102)	Sweden (139)	USA (409)
Salary (S\$)	3,281.4	3,459.4	3,374.1	3,570.3	3,209.4	3,043.8	3,942.5	3,470.0	3,601.6
Gender (F)	56.10%	62.20%	51.60%	51.20%	46.90%	75.60%	28.40%	38.10%	51.10%
UAS	70.12	75.64	58.78	74.97	70.54	81	62.01	70.18	69.19
1st Year CAP	4.09	3.72	4	4.13	3.9	3.66	4.05	3.97	4.06
CAPGrad	4.12	3.84	4.02	4.13	3.99	3.76	4.03	4.04	4.09
Honors	88.70%	78.00%	92.30%	89.90%	88.80%	70.50%	84.30%	90.60%	85.80%
No. of FA	8.9	9.51	10.05	7.46	11	9.11	6.4	8.45	7.63
Amount of FA	S\$10,848	S\$10,105	S\$9,707	S\$9,559	S\$10,975	S\$10,356	S\$7,281	S\$9,872	S\$8,601
BIZ	19.80%	30.70%	8.90%	8.30%	8.20%	15.60%	9.80%	15.10%	18.10%
FASS	19.80%	25.20%	17.30%	32.70%	16.30%	29.10%	33.30%	23.70%	27.40%
FoE	25.00%	11.80%	47.00%	26.80%	30.60%	16.80%	22.50%	31.70%	18.80%
FoS	31.10%	14.20%	15.50%	23.80%	30.60%	20.90%	20.60%	12.90%	23.20%
SDE	1.90%	16.50%	9.50%	4.80%	2.00%	15.60%	3.90%	7.90%	5.10%
SoC	2.40%	1.60%	1.80%	3.60%	12.20%	2.00%	9.80%	8.60%	7.30%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
International	20.30%	12.60%	38.70%	13.70%	17.30%	5.70%	23.50%	20.90%	17.60%
SG Citizen	74.50%	84.30%	51.20%	81.50%	77.60%	90.20%	73.50%	77.00%	76.30%
PR	5.20%	3.10%	10.10%	4.80%	5.10%	4.10%	2.90%	2.20%	6.10%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Variables of Interest

The annual Graduate Employment Survey (GES) reports three key employment outcomes that are of interest: the monthly gross salary, the time at the start of job search and the time when the first job offer is

received. Using the start of job search and the time when the first job offer is received, we calculate the duration of job search. This survey is conducted a few months after the individual's graduation. Another variable of interest is the CAP at graduation, which is a proxy for academic performance.

Methodology

We adopt two methods in this study, namely, Ordinary Least Squares regression (OLS) and Propensity Score Matching (PSM).

1. *OLS Regression*

OLS regression serves as a benchmark against which we compare the PSM results. However, these estimates are likely to be biased because variables that determine SAP participation also help predict the employment outcomes and academic performance at graduation. For example, a student with a high University Admission Score is more likely to have participated in SAP and earned a higher starting salary. To capture the true SAP effect, one would need to know the related outcome that a SAP participant would have obtained had he or she not participated in SAP. This counterfactual cannot be determined in this framework given the context. Note that the OLS estimates of the SAP treatment effect report the mean effect of SAP participation after controlling for the observable variables and rely on parametric assumptions. On the contrary, the propensity score matching (PSM) approach described below, accounts for the effects of these variables on the outcomes non-parametrically, thereby offering greater flexibility in the estimation procedures.

In the following, we briefly describe the Propensity Score Matching model and its assumptions.

2. *Propensity Score Matching (PSM)*

Adapting the definition of propensity score as defined by Rosenbaum and Rubin (1983) to the context here, it is the probability ("score") of SAP participation conditional on observed baseline characteristics of individuals. PSM matches SAP participants with non-participants based on their propensity score of participation. The key assumption is that if a set of individuals have the same propensity score, the distribution of *observed* baseline covariates will be the same between the SAP and non-SAP individuals. The propensity score allows one to design and analyse an observational (nonrandomised) study so that it mimics some of the particular characteristics of a randomised controlled trial.

Using the Probit Model, we estimate each individual's likelihood of participating in SAP ("score") given the observable variables:

Probability of Participating in SAP

$= f(\text{gender, residency, citizenship, ethnicity, Degree Type, Field of Study, UAS, First Year CAP, Amount and Number of Times of Financial Aid Received})$.

In order to compute the difference in the outcomes, we use the technique of stratification matching.⁷ This algorithm involves stratifying individuals into mutually exclusive subsets based on their estimated propensity score. Individuals are ranked according to their propensity score and then stratified into subsets based on previously defined thresholds of the estimated propensity score.⁸ Within each propensity score stratum, SAP and non-SAP individuals will have approximately similar values of propensity score and thus the distribution of measured baseline characteristics will be approximately similar between SAP and non-SAP individuals within the same stratum, which is indeed the case here. We then compare the effect of SAP by comparing the outcomes directly between SAP and non-SAP individuals within each stratum. The stratum-specific estimates of SAP effect are then pooled to estimate an overall SAP effect (Rosenbaum & Rubin 1984).⁹

⁷ As noted in Heckman et al. (1997) and Caliendo and Kopeinig (2008), when the sample size is large all of the PSM estimators yield the same results.

⁸ Cochran (1968) and Rosenbaum and Rubin (1984) demonstrated that stratifying on the quintiles of propensity score eliminates approximately 90% of the bias due to measure confounders when estimating a linear effect. Increasing the number of strata used should result in improved reduction, although the marginal reduction in bias decreases as the number of strata increases (Cochran 1968; Huppler & Louis 2002).

⁹ Heckman et al. (1997) reports that the choice of matching algorithm can affect the results in small samples; however as the sample size increases, all of the PSM estimators will eventually yield the same results (Caliendo and Kopeinig 2008).

Results

1. Ordinary Least Squares (OLS)

Table 7 summarises the findings on average salary, job search duration and academic performance from OLS. Overall, a higher salary is positively correlated to participation in SAP, being male, a lower UAS, a higher graduating CAP and having double degrees. Graduates from business, engineering, School of Design and computing all have higher starting salary compared to graduates from Faculty of Arts and Social Sciences while graduates from science have less. Financial aid plays little role in determining the outcomes. The OLS findings serve as a reference to the findings using the propensity score matching.

Table 7 OLS Estimation Results I

	Salary	Search	Honors	Grad CAP
Exchange (ever / in 5th sem)	145.9***	0.13	0.162**	0.0316***
Gender (F)	-295.4***	-0.604***	-0.0728	0.0363***
UAS	-1.841**	0.00183	0.00310*	0.000695***
Degrees	492.4**	0.366	Stata reject	0.105***
Honors	45.9	0.202		0.376***
Faculty (FASS as baseline)				
BIZ	444.3***	0.532**	-0.350***	-0.0109
FoE	238.2***	0.192	2.067***	-0.0610***
FoS	-75.76*	0.229	0.355***	-0.0495***
SDE	175.0***	-0.867***	2.452***	-0.156***
SoC	435.3***	-0.0103	2.387***	-0.0865***
Residence (Singapore Citizen as baseline)				
International	6.875	0.837***	0.195	-0.0431***
PR	-46.58	0.578**	-0.0375	-0.00429
Ethnicity (Chinese as baseline)				
Indian	-59.44	1.082***	-0.0569	-0.0344*
Malay	-265.3***	0.687	0.151	-0.0815***
Time Varying Variables		Total Value		1st Year Value
Graduating CAP	333.5***	0.301*	4.122***	0.596***
No. of FA items received	10.48	-0.0931	0.0840*	-0.00933*
FA amount received	-15.28	0.108*	0.0468	0.00151
Constant	1,462***	1.06	-15.36***	1.170***
Observations	3,003	2,655	5,008	5,093
R-squared	0.156	0.06		0.817

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Estimation for full set of graduation semester dummies and ethnicity dummies (Europeans and Sikhs) are not reported.

Estimation Results from Propensity Score Matching (PSM)

Propensity Score Estimation

Using the Probit model described above, we estimate the Propensity score, i.e., the likelihood that an undergraduate participates in SAP, as a function of the independent variables such as gender, residency, citizenship, ethnicity, degree type, field of study, UAS, first Year CAP, amount and number of times of financial aid received). Table 8 shows that gender is a significant factor and female undergraduates are more likely than male undergraduates to participate in SAP. In terms of participation across the schools and faculties, business and engineering students are more likely than others to participate in SAP. Singapore citizens are also more likely than international students to participate in SAP. Malay students are less likely than other ethnic groups to participate in SAP. A higher CAP and a larger amount of financial aid (instead of the number of financial aid) are also key factors in increasing the likelihood of SAP participation.

Table 8 Probit Estimation Results

Probability of SAP	
SAP	
Gender (Male as baseline)	0.176***
UAS	-0.00136
Degrees	0.132
Faculty (FASS as baseline)	
BIZ	0.710***
FoE	0.179***
FoS	-0.0372
SDE	0.112
SoC	-0.0727
Residence (Citizen as baseline)	
International	-0.273***
PR	-0.122
Ethnicity (Chinese as baseline)	
Indian	-0.157
Malay	-0.508***
Time varying variables	1st year value
CAP	0.824***
FA items received ('0)	-1.469***
FA amount received ('0000)	1.451***
Constant	-3.524***
Observations	5,093

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Upon estimating the propensity score for each undergraduate, we ranked all the undergraduates according to their scores and stratified them into groups whereby within each group, all individuals have similar propensity scores. This implies that based on the independent variables such as gender, UAR, field of study, individuals in the same group have the same estimated likelihood to participate in SAP. However, in reality, only some of them in the dataset actually participated in SAP. This enables us to examine the impact of SAP by comparing the employment outcomes between “SAP” individuals and “non-SAP” individuals within each group who are estimated to be similar along the observed variables.

Impact of SAP on Monthly Salary

We estimate the effect of SAP on graduates’ monthly salary by estimating a regression model:

$$\text{Monthly salary} = f(\text{SAP}, \text{gender}, \text{UAS}, \text{residency}, \text{ethnicity}, \text{Degree Type}, \text{Field of Study}, \text{Degree Conferred}).$$

After controlling for potential sample selection bias using PSM, we find that SAP participation increases graduates’ monthly salaries by S\$190.40 (Table 9). This finding is significant at the 1% level of significance. Over an average salary of S\$3,207 (Table 4), this translates to a 5.9% increase. The OLS method (Table 7) underestimates the effect scale (S\$145.90), probably due to the differential SAP effects by gender. As shown in Table 10, the SAP effect on females is higher than on males. In the PSM method, a larger weight would be given to the female SAP effect than to the male SAP effect (more female participants), relative to OLS which would give roughly equal weight to males and females.

For instance, females are on average more likely to participate in SAP but receive lower salaries than males. This could be because Singaporean females generally receive a lower starting salary than their male counterparts in the government service due to the requirement for male Singaporeans to participate in two years of national service in the Ministry of Defence prior to their enrolment in the university.

Table 9 PSM Estimation Results I (Monthly Salary)

PSM Estimation Results					
Y	# of SAP	# of non-SAP	Coeff.	S.E.	t-statistics
Salary	1,304	1,669	190.40***	53.55	3.56

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Effect Decomposition by Demographics and Programme Type (Table 10)

In the following, we examine the salary impact decomposition based on the matched samples.

Gender. Among female undergraduates, those who participated in SAP had higher salaries than those who did not by an average of S\$187.50. SAP participation however, has no significant difference in salary among the male undergraduates.

Field of Study. In the fields of study of business (BIZ), arts and social sciences (FASS) and science (FoS), graduates who participated in SAP had S\$480.90, S\$252.10 and S\$267.80 higher salaries than their counterparts who did not participate in SAP. No significance difference between SAP and non-SAP individuals was observed in other fields of study.

CAP. The salary impact of SAP participation is most pronounced for graduates with CAP above 4.5 and between 3.5 and 4.0. These two groups of graduates enjoy an average salary that is higher by S\$445.25 and S\$194.12 respectively. For graduates with CAP between 4.0 and 4.5, the impact of SAP is more moderate with a salary increase of S\$159.83. It is worthwhile to note that the impact of SAP on graduates' salary is not uniform across their CAPs. Rather, graduates in the lower CAP range of 3.5 and 4.0 benefitted more from SAP participation than graduates in the CAP range of 4.0 and 4.5. Nonetheless, the SAP impact is greatest for graduates with CAP more than 4.5.

SAP Programme Type. In terms of SAP programme type, participants in NOC and NOC (Singapore) had higher average salaries in the magnitude of +S\$690.70 and +S\$315.90 respectively. Participants in SEP also enjoyed an average premium of S\$213.90 compared with individuals who did not participate in SAP. Participation in overseas summer/winter programmes sees the graduates having a salary moderately higher by S\$110.

Destination. Compared to graduates who have never participated in SAP, graduates who attended SAP in Singapore, USA, China and UK reported higher monthly salaries by an amount of S\$619.50, S\$400.50, S\$365.70 and S\$228.30 respectively. As mentioned above, the group of students who have participated in programmes in Singapore have a rather unique profile, i.e., mostly international students with very high CAP (4.27) graduating with an honours degree (Table 5). Such a profile might explain why their average salary is also higher than those who participated in programmes in other destinations. As the number of participants in this group is relatively small, generalisability of this particular result is therefore limited.

Table 10 PSM Estimation Results II (Monthly Salary)

Y= Salary	# of SAP	PSM Estimation Results			
		# of non-SAP	Coef.	S.E.	t-statistics
Panel A: By Gender					
Male	629	798	174.3	126.1	1.38
Female	675	850	187.5***	40.38	4.64
Panel B: By Faculty					
BIZ	246	106	480.9**	197.7	2.43
FASS	335	479	252.1***	89.97	2.8
FoE	306	416	-36.4	126.4	-0.29
FoS	250	355	267.8***	69.08	3.88
SDE	101	140	169.1	123.6	1.37
SoC	59	119	128.4	191.2	0.67
Panel C: By Residency					
International	188	262	77.8	149	0.52
SG-Citizen	1,048	1,283	224.8***	62.61	3.59
SG-PR	68	75	147.1	178.1	0.83
Panel D: By Ethnicity (not Exclusive)					
Chinese	1,211	1,429	200***	51.02	3.92
Indian	22	80	169.3	235.2	0.72
Malay	18	49	550.6*	333.5	1.65
Panel E: By CAP					
2.5-3.0	24	145	85.3	175.54	0.486
3.0-3.5	131	433	45.16	81.81	0.552

3.5-4.0	420	546	194.12***	64.61	3.004
4.0-4.5	544	392	159.83*	93.87	1.703
>4.5	174	80	445.24**	226.66	1.964
Panel F: By Programme Type (not Exclusive)					
SEP (overseas)	960	1,623	213.9***	71.74	2.98
SWP	319	1,638	110*	60.15	1.83
NOC	58	1,070	690.7***	217.6	3.17
Local	46	1,117	297.4	201.8	1.47
NOC (Singapore)	24	1,380	315.9*	177.7	1.78
Panel G: by SAP Destination (not Exclusive)					
Canada	124	1,505	107.4	113.5	0.95
China	85	1,394	365.7***	127.2	2.87
Germany	90	1,607	169.9	110.7	1.53
Great Britain	89	1,377	228.3**	106.9	2.14
Hong Kong	61	1,350	52.95	98.92	0.54
Korea	148	1,512	48.54	71.23	0.68
Singapore	68	1,357	619.5***	159.1	3.89
Sweden	82	1,308	203*	113.8	1.78
USA	232	1,620	400.5***	103.3	3.88

SAP participants are matched to non-SAP participants of the same category. For example, SAP BIZ graduates are matched and compared with non-SAP BIZ graduates.

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Impact of SAP on Job Search Duration (in Months)

We estimate the effect of SAP on graduates' job search duration by:

$Y = f(\text{SAP}, \text{gender}, \text{UAS}, \text{residency}, \text{ethnicity}, \text{Degree Type}, \text{Field of Study}, \text{Degree CAP}, \text{Conferred}, \text{Graduation Term}, \text{Amount and Number of Times of Financial Aid Received})$.

After controlling for potential sample selection bias by using PSM, we find that SAP participation has no significant effect on job search duration (Table 11). As illustrated in Table 12, decomposition estimation shows that SAP participation have similar non-significant effect on most groups of graduates except for international students, who reported a longer job search duration. This is likely due to visa requirements for this group of graduates.

Table 11 PSM Estimation Results I (Job Search Duration)

Y	PSM Estimation Results				
	# of SAP	# of non-SAP	Coeff.	S.E.	t-statistics
Duration	1,117	1,488	0.129	0.15	0.84

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Table 12 PSM Estimation Results II (Job Search Duration)

PSM Estimation Results Excluding Part-Time B.Tech Students					
Y= Duration	# of SAP	# of non-SAP	Coeff.	S.E.	t-statistics
Panel A: By Gender					
Male	528	725	0.387	0.24	1.63
Female	589	755	-0.031	0.18	-0.17
Panel B: By Faculty					
BIZ	221	102	0.692	0.57	1.21
FASS	266	396	0.373	0.23	1.59
FoE	287	401	0.059	0.24	0.25
FoS	194	284	0.26	0.31	0.84
SDE	85	130	-0.502	0.28	-1.8
SoC	58	108	0.036	0.46	0.08
Panel C: By Residency					
International	188	271	0.771**	0.31	2.52

SG-Citizen	860	1,117	0.061	0.25	0.25
SG-PR	69	68	-0.183	0.52	-0.35
Panel D: By Ethnicity (not Exclusive)					
Chinese	1,036	1,256	0.094	0.16	0.59
Indian	23	55	0.979	0.98	1
Malay	13	19	0.967	1.21	0.8
Panel E: By Honours Degree					
non-Honours	173	504	0.493	0.3	1.62
Honours	944	955	-0.014	0.17	-0.08
Panel F: By Programme Type (not Exclusive)					
SEP (overseas)	827	1,469	0.169	0.18	0.93
SMP	271	1,490	-0.006	0.16	-0.04
NOC	52	957	0.447	0.78	0.58
Local	37	915	0.172	0.51	0.34
NOC((Singapore)	22	1,191	1.108	0.66	1.68
Panel G: by SAP Destination (not Exclusive)					
Canada	95	1,321	0.303	0.38	0.8
China	76	1,214	0.098	0.27	0.36
Germany	82	1,448	-0.079	0.29	-0.27
Great Britain	69	1,204	-0.484	0.38	-1.27
Hong Kong	52	1,166	0.209	0.37	0.56
Korea	127	1,331	-0.382	0.28	-1.34
Singapore	42	1,171	0.113	0.49	0.23
Sweden	72	1,217	0.236	0.6	0.39
USA	195	1,460	-0.063	0.27	-0.23

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Impact of SAP on Academic Performance (Graduating CAP)

Using PSM and after controlling for a variety of covariates, we find that SAP participation increased CAP at graduation by 0.041 and increased the likelihood of graduating with an honours degree by 0.053. Nonetheless, the magnitude of the effect of 0.041 is moderate once we take into consideration that the CAP is over a 5-point scale.

Although there was some significant impact when we examine the SAP effect decomposition in Table 14, the magnitude is generally moderate and ranges from 0.024 to 0.08. In particular, SAP impact is observed among male graduates but not among female graduates. SAP participation also increased graduates' academic performance by 0.056, 0.075 and 0.077 for graduates in Arts and Social Sciences, Engineering and Science. International students and Chinese graduates also benefitted from SAP participation which increased their academic performance by 0.081 and 0.036 respectively.

Interestingly, non-honours graduates benefitted more (0.058) than honours graduates (0.024) by participating in SAP, likely due to the ceiling effect as honours students already had a high CAP. Among all the SAP programmes, only participation in summer/winter programmes led to a higher graduating CAP by 0.055. Finally, SAP participation in Canada, Germany, Hong Kong, Sweden and USA recorded higher graduating CAPs.

Table 13 PSM Estimation Results I (Academic Performance)

PSM Estimation Results Excluding Part-Time B.Tech Students					
Y	# of SAP	# of non-SAP	Coeff.	S.E.	t-statistics
Graduating CAP	2,192	2,843	0.041***	0.01	2.81
Honors	2,192	2,843	0.053***	0.01	3.78

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Table 14 PSM Estimation Results II (Academic Performance)

PSM Estimation Results Excluding Part-Time B.Tech Students						
Y= Graduating CAP	# of SAP	# of non-SAP	Coef.	S.E.	t-statistics	
Panel A: By Gender						
Male	1,029	1,348	0.058***	0.02	2.58	
Female	1,163	1,469	0.018	0.02	1.21	
Panel B: By Faculty						
BIZ	373	157	0.03	0.04	0.76	
FASS	564	812	0.056***	0.02	2.71	
FoE	526	720	0.075***	0.03	2.73	
FoS	465	693	0.077***	0.02	3.38	
SDE	158	224	-0.006	0.04	-0.16	
SoC	96	188	0.006	0.05	0.13	
Panel C: By Residency						
International	394	604	0.081***	0.03	2.71	
SG-Citizen	1,675	2,063	0.02	0.02	1.02	
SG-PR	123	143	0.064	0.06	1.07	
Panel D: By Ethnicity (not Exclusive)						
Chinese	1,998	2,400	0.036***	0.01	2.47	
Indian	68	139	0.092	0.07	1.25	
Malay	33	90	0.037	0.12	0.31	
Panel E: By Honours Degree						
non-Honours	344	1,003	0.058**	0.03	2.03	
Honours	1,848	1,793	0.024*	0.01	1.79	
Panel F: By Programme Type (not Exclusive)						
SEP	1,604	2,761	0.021	0.02	1.24	
SWP	555	2,804	0.055***	0.02	2.56	
NOC	87	2,075	0.078	0.05	1.55	
Local	66	1,905	0.055	0.04	1.43	
NOC (Singapore)	41	2,303	0.085	0.06	1.49	
Panel G: by SAP Destination (not Exclusive)						
Canada	209	2,594	0.053*	0.03	1.84	
China	127	2,399	0.054	0.04	1.34	
Germany	168	2,645	0.08***	0.03	2.55	
Great British	166	2,510	0.033	0.03	0.96	
Hong Kong	98	2,409	0.074*	0.04	1.89	
Korea	243	2,612	0.015	0.03	0.55	
Singapore	102	2,368	0.038	0.05	0.81	
Sweden	136	2,591	0.084***	0.03	2.65	
USA	407	2,800	0.076***	0.02	3.19	

Significance levels: *p<0.1, ** p<0.05, *** p<0.01

Discussion and Conclusion

This paper presents a study on the impact of SAP on employment outcomes. This is the first instance where a sufficiently large dataset offers a comprehensive look into the variables that might affect participation (and selection) in SAP. This enables us to use propensity score matching to address, to some extent, the issue of selection bias when examining the impact of SAP on employment outcomes.

Our research yields several interesting results. Firstly, we find that SAP participation increases the graduates' monthly salary of their first job. This impact is particularly pronounced in study abroad programmes that include at least a six-month internship opportunity. This suggests that in addition to studying in an overseas partner institution of higher education, overseas internship opportunities may offer more benefit in terms of employment outcome. Secondly, we find that the impact of SAP is non-linear across students with varying CAPs. More specifically, the impact of SAP participation on monthly salary presents a U-shaped pattern, with students having excellent (more than 4.5) and average CAPs (3.5-4.0) enjoying the highest increase while students with high CAP (4.0-4.5) having a more moderate effect. This finding suggests that when selecting students for SAP participation, greater effort could be made to encourage participation from students with

average CAPs as this group of students benefit fairly substantially from SAP participation. The reason behind this could be that SAP participation enables these students to differentiate themselves from other ‘average’ students, thus gaining some advantage in the employment outcome.

The findings present some policy implications which we can consider. First, global internships of up to six-months may potentially yield benefits in employment outcomes. Currently, the idea of a semester-long global internship is not as prevalent as a semester-long SAP. The findings here may provide reason to begin a shift in universities to not only provide SAP as the main student mobility vehicle, but augmenting it with global internships of up to six months, or by co-op education programmes that integrate a student's academic studies with work experience. Second, the selection criteria for a student's application for a SAP may include a mixture of academic performance (CAP) and other factors (e.g. personal statement, co-curricular activity record, or interviews). The finding that average students on SAP enjoy a higher increase in monthly salary suggests that CAP should play a smaller role in the selection criteria, as using CAP as a selection criteria for SAP participation may screen out some students who are likely to benefit more from the programme and thus may not be a desirable criterion. This would allow for more creative ways to put together a set of criteria that showcases the student's personality and aptitude, rather than using CAP as a main baseline criterion. All the policy implications above point towards a shift in paradigm in viewing the way we conduct and define SAP and how we select students into SAP.

Finally, we note that one of the drawbacks with the Propensity Score Matching methodology is that it can only account for observed covariates. Variables that cannot be observed (for example, personality traits, motivation and family background) but may affect whether an individual participates in SAP or otherwise cannot be accounted for in the matching procedure. As the procedure only controls for observed variables, any hidden bias due to latent variables may remain after matching. Attempts have been made to address such hidden bias by adopting regression discontinuity as an alternative methodology. However, as most faculties use a range of criteria in SAP selection, the sample size in the current dataset is too small to yield any significant effect.

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Annex 1

Bringing the World to NUS

Duke-NUS Medical School

The beginnings of the Duke-NUS medical school can be traced to 2000, when Singapore launched an ambitious Biomedical Sciences Initiative designed to make the country the biomedical hub of Asia, and to attract both research and health sector manufacturing capabilities to Singapore. In 2001, a Medical Education Review Panel chaired by Lord Oxburgh of England, evaluated the plan and recommended that Singapore establish a graduate medical school (Duke-NUS) to produce the highly trained medical leaders needed to support the Biomedical Sciences Initiative. According to the Ministry of Education, the establishment of a graduate-entry medical school will increase the supply of doctors practicing in Singapore, give the country the flexibility to produce more physicians to meet future needs, and train doctors who are exposed to clinically-related research, thus increasing the nation's capacity to develop a vibrant biomedical hub. Duke-NUS is intended to complement the National University of Singapore's existing undergraduate medical school.¹⁰

Yale-NUS College

Singapore's first liberal arts college, the Yale-NUS College, was officially launched in 2011 in NUS by the country's Prime Minister, Mr Lee Hsien Loong. A collaboration between NUS and Yale University, the Yale-NUS College, an autonomous college of NUS, brings together two universities with distinctive strengths to create a model of residential liberal arts education that is unique in Asia. The curriculum synthesises Western and Asian

¹⁰ Duke-NUS Medical School (2016). The Duke-NUS Story. <https://www.duke-nus.edu.sg/about/duke-nus-story>. Accessed 14 October 2016.

perspectives with an integrated general education spanning the first two years of study before concentration on a major. It is also the first campus outside New Haven, Connecticut, that Yale University has developed.¹¹

NUS University Town (UTown)

The NUS University Town (UTown) was established in 2011 and is an educational hub located within the NUS campus complete with residential spaces, teaching facilities and study clusters. It has created a lively intellectual, social and cultural environment for local and international members of the NUS community that distinguishes the University through excellence in learning and student engagement. UTown also houses the Campus for Research Excellence And Technological Enterprise (CREATE), which is an international research campus and innovation hub. Home to a vibrant research community of over 1,200 researchers, CREATE hosts the National Research Foundation, interdisciplinary research centres from top universities and corporate laboratories such as the Singapore-MIT Alliance for Research and Technology (SMART), the SAP Singapore Research Centre as well as technology incubators and start-ups.¹²

With these global initiatives on campus, it is not surprising that the NUS campus itself is already a global one, with close to 50% of the faculty and postgraduate students and about 14% of the undergraduates hailing from outside Singapore.

NUS Suzhou Research Institute (NUSRI)

In addition to bringing students out to the world and the world to NUS, NUS made its foray overseas for the first time with the NUS Suzhou Research Institute (NUSRI). NUSRI was founded in 2010, with an official agreement sign-off ceremony between National University of Singapore (NUS) and Suzhou Industrial Park Administrative Committee (SIPAC). It is the first research institute in China which is independently operated and managed by an overseas top university, to reinforce the cooperation in science and education between China and Singapore. The development of NUSRI is timely in promoting more international research activities within Suzhou Industrial Park (SIP). Rallying the diverse insight, world class scientific research resources and innovation ability of the university, NUSRI aims to focus on dedicated research, training and technology commercialisation service to contribute to social transformation and upgrading as well as sustainable development, not only to SIP and Suzhou city but also the Jiangsu province and eventually to the whole of China. It also conducts annual summer and winter programmes for NUS students and international students.¹³

¹¹ National University of Singapore (2011). NUS and Yale to Create Singapore's First Liberal Arts College. <http://news.nus.edu.sg/press-releases/738-nus-and-yale-to-create-singapore-s-first-liberal-arts-college?highlight=WyJ5YWxLW51cyIsInlhbGUtbnVzJyIsImNvbGxIZ2UiLCJjb2xsZWdIJ3MiLCJ5YWxLW51cyBjb2xsZWdIII0>. Accessed 14 October 2016.

¹² NUS University Town (2016). CREATE Campus for Research Excellence And Technological Enterprise. <http://utown.nus.edu.sg/about-university-town/create-2/>. Accessed 14 October 2016.

¹³ NUS (Suzhou) Research Institute (2015). NUSRI Profile. <http://www.nusri.cn/en/AboutUs/NUSRI%20Profile>. Accessed 14 October 2016.

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