DISCUSSION PAPER SERIES

Depth or Diversity? Examining the Longer Run Impacts of College Curriculum Breadth

Kelvin KC Seah
Jessica Pan
Poh Lin Tan

DISCUSSION PAPER SERIES

Depth or Diversity? Examining the Longer Run Impacts of College Curriculum Breadth

Kelvin KC Seah
National University of Singapore and IZA

Jessica Pan
National University of Singapore and IZA

Poh Lin Tan
National University of Singapore

AUGUST 2025

ABSTRACT

Depth or Diversity? Examining the Longer Run Impacts of College Curriculum Breadth

Existing research suggests that broad versus specialized university curricula does not significantly lead to differences in earnings and unemployment outcomes shortly after graduation. This paper builds on previous work by examining the impact of curriculum breadth on medium-term labor market outcomes, up to six years after students have graduated. Exploiting a unique episode in the history of the National University of Singapore, in which a university-wide revision in graduation requirements in 2007 prompted students in a large faculty to unexpectedly read a more specialized curriculum, we find, using a difference-in-differences approach, that while taking a more specialized curriculum does not initially affect labor earnings shortly after graduation, its effect becomes negative and increases with work experience. We find no evidence that lower earnings are due to a lower propensity to switch jobs, suggesting weaker within-firm earnings trajectories among more specialized graduates.

Corresponding author:
Kelvin KC Seah
National University of Singapore
21 Lower Kent Ridge Road
Singapore 119077

E-mail: kelvinseah@nus.edu.sg

1.   Introduction

A question of interest to most college students is whether a highly specialized curriculum or a more broad-based university education would better prepare them for the labor market. On the one hand, greater in-depth training and knowledge in a specific field may allow graduates to command higher wages because it imparts skills and knowledge that are more immediately relevant to specific jobs and because it results in a smaller pool of similarly qualified competitors (Brunello and Rocco, 2017; Golsteyn and Stenberg, 2017; Hampf and Woessmann, 2017; Hanushek et al., 2017; Verhaest et al., 2018; Deming and Noray, 2020); on the other hand, a broader curriculum may open doors to a wider range of job options due to a more diverse build of skillsets (Lazear, 2005; Silos and Smith, 2015). Moreover, students who explore a greater variety of training and knowledge may have more of an opportunity to gain information about their aptitudes and preferences. By doing so, they face a lower risk of costly mismatches later down the road including working in occupations unrelated to their major (Malamud, 2011; Bordon and Fu, 2015), and may be less vulnerable to skills-displacing technological advances that have particularly affected skilled workers (McGuiness et al., 2021).

Despite the clear implications of the question for worker welfare and economic dynamism, relatively few studies have investigated the impact of curriculum breadth on labor market performance. A key obstacle to identification is the problem of student self-selection into educational pathways, introducing endogeneity into the key independent variable of interest. Some studies have sought to overcome the selection issue by using sources of exogenous variation (see, e.g., Oosterbeek and Webbink, 2007; Malamud and Pop-Eleches, 2010; Hall, 2012; Hall, 2016), but these have almost exclusively examined the impact of curriculum breadth at the secondary school level. To the extent that specialized knowledge and training at the tertiary level is more rigorous and perceived as such by employers, or conversely, if variety of skill acquisition at the tertiary level is more informative and valued, the returns to curriculum breadth may be different. More recently, Seah, Pan and Tan (2020) exploited variation caused by a faculty-specific revision of university graduation requirements to compare outcomes of new market entrants in the affected faculty before and after the revision, relative to those in unaffected faculties. The study finds little evidence that curriculum breadth in the university produces either advantages or disadvantages in the labor market outcomes of graduates six months after graduation.

A number of important gaps in the literature remain. Most crucially, the longer-run labor market impacts of more specialized tertiary training and knowledge remain unclear. By exposing students to a more diverse range of skills and knowledge, a broader curriculum may increase graduates' access to a wider range of jobs, allow them to switch more flexibly between positions and industries, and hence be better placed to adjust or even take advantage of shifts in market demand for certain occupations and skillsets, including entrepreneurship (Lazear, 2005; Verhaest et al., 2018). By contrast, workers who acquire more in-depth occupation-specific human capital may enjoy gains early on in their careers as the skills learnt are directly relevant for their jobs and paves a smoother entry into the workforce. However, the gains may decline over time as these skills become obsolete, especially for those working in occupations

with high rates of job skill change such as those in science, technology, and engineering (Deming and Noray, 2020). Workers with more in-depth occupation-specific human capital may also tend to endure longer periods of unemployment during job switching, due to a greater incentive to seek employment in a highly related occupation or industry in order to maintain a wage premium (Herz, 2019). Similarly, Silos and Smith (2015) find that in a model where individuals face uncertainty regarding outcomes and match quality, broader skillsets tend to be more optimal for job switching, whereas greater specialization pays off for workers who stay within a job type. Hence, curriculum breadth not only affects career advancement within departments and firms, but also influences the probability and frequency of job separations and unemployment, with implications for wage trajectories over time.

This study seeks to address this crucial gap. We rely on the same source of exogenous variation previously used in Seah, Pan and Tan (2020), and exploit variation generated by a sudden and unanticipated increase in major requirements for graduation at the Faculty of Arts and Social Sciences (FASS) at the National University of Singapore (NUS) in 2007, which caused affected student cohorts to reduce the breadth of their curriculum by around 10% (no significant changes were observed among students in unaffected faculties). We compare the labor market performance of graduates from the affected faculty before and after the revision, relative to those in unaffected faculties. We access the same source of university administrative data, which provides detailed information on students' socio-demographic characteristics, pre-university academic ability, modules taken, cumulative average point (or CAP, which is comparable to grade point average in the US context), and number of years of study, allowing us to control for a wide range of attributes. This rich set of controls and the exogenous variation we employ, provides confidence that our results are not biased by student self-selection into curriculum breadth.

We extend our previous analysis in several meaningful ways. First, we use much higher quality labor market data. Unlike the previous study, which relied on survey data collected from individuals within the first year of graduation, and hence faced higher rates of selective response, this study uses administrative tax records matched to the above university administrative data, providing much more complete and accurate labor market data. Second, and most importantly, the administrative tax data provides information on individual's earnings profile for up to six years after graduation, rather than only shortly after graduation, allowing us to identify the medium-term labor market impacts of tertiary curriculum breadth. Third, we examine the probability of job switching as a potential mechanism for differences in wage trajectories.

In contrast to previous studies that have tried to estimate the causal impact of curriculum breadth on labor market outcomes (e.g. Dolton and Vignoles, 2002; Johnes, 2005; Oosterbeek and Webbink, 2007; Malamud and Pop-Eleches, 2010; Hall, 2012; Hall, 2016; Seah, Pan and Tan, 2020), our results point to a positive relationship between more diverse tertiary training and labor earnings which increases with number of years after graduation. In particular, we find that cohorts that were required to take a more specialized college curriculum saw 1.9 percent lower earnings two years after graduation than earlier cohorts, relative to the same difference in unaffected faculties (statistically insignificant). The effect increased with years of work experience and peaked at 4.8 percent lower earnings in the sixth year after

graduation, the latest year available in the dataset, significant at the 10% level. When we scale these estimates using the curricular reform as an instrument for curriculum breadth, the results suggest that every 1 percentage point (pp) increase in the share of modules read outside one's major leads to an increase in labor earnings by 0.34 percent in the second year after graduation (insignificant), increasing to 0.85 percent in the sixth year after graduation (significant at the 5% level). Taken together, our results suggest that taking a more diverse curriculum has a positive and sizeable impact on income, which increases with working experience. One interpretation is that tertiary graduates that take a broader curriculum have more diverse skills and training that are rewarded on the job by employers.

Next, we consider whether individuals who specialize less in university tend to earn more due to a more diverse skillset that allows them to respond more flexibly to shifts in labor market demand by switching jobs more readily. We find weak evidence that more diverse tertiary training results in a higher probability of job changes, or of switching to a different industry. We conclude that affected cohorts' lower earnings are primarily due to weaker within-firm earnings trajectories among more specialized graduates, rather than a lower propensity to switch jobs or industries.

This study offers the following contributions to the literature on curriculum breadth and labor outcomes. First, few studies have tried to investigate the causal impact of curriculum breadth on labor market performance, and even fewer have done so at the tertiary level, which may be arguably more relevant to hiring decisions than curriculum breadth at the secondary school level. Second, this study uses high quality administrative tax records matched to the above university administrative data, which provides information on students' earnings profile for up to six years after graduation. This innovation turns out to be crucial: although employers may place more weight on academic performance than on course diversity at the hiring stage (Seah, Pan and Tan, 2020), the analysis shows that level of specialization in knowledge and training leads to significant differences in earnings in the following years after entry into the labor market. Third, we provide evidence suggesting that differences in probability of job switching can be ruled out as a potential mechanism for differences in wage trajectories.

The structure of the rest of the paper is as follows. Section 2 describes the institutional background. Section 3 discusses the data sources and summary statistics. Section 4 details the empirical methodology. Section 5 presents the results. Finally, Section 6 summarizes and concludes.

2.   Institutional Background

The National University of Singapore (NUS) is Singapore's largest public university. In the time period considered in our study (which relates to admission cohorts 2005-2008), the university comprised 12 different faculties for undergraduate study, with the largest being the faculties of Arts and Social Sciences (FASS), Engineering (FoE), Science (FoS), Business (BIZ), and Computing (SoC). Together, these 5 faculties accounted for more than 80% of the undergraduate enrollment.

NUS awards two types of undergraduate degrees: a three-year bachelor's degree without honors or a four-year degree with honors. Each student graduates with only one of these two types of degrees. The "honors" degree is used as a signal to indicate that a student has read a larger volume of material than required for a three-year bachelor's program. Students have to meet strict university performance thresholds (measured by cumulative academic performance or CAP), evaluated at an advanced stage of their academic candidature (no earlier than the second year of study) to qualify for the honors track. Roughly 60% of students from each cohort graduate with an honors degree.

NUS follows a modular system where students have the flexibility to choose the modules they wish to read in order to fulfill their degree requirements. Over the course of their undergraduate candidature, students have to complete a pre-determined number of Modular Credits (MCs) in order to graduate: this is usually 120 MCs for the three-year (bachelor's) degree and 160 MCs for the four-year (honors) degree. A Modular Credit (MC) is a unit of time and effort expected of a student: 1 MC corresponds to approximately 2.5 hours of study and preparation per week. A 4-MC module would therefore require a student to commit to 10 hours of work a week, including lectures, tutorials, and self-study in the form of preparatory work and completing assignments. The MC requirements are broadly divided into three categories: University-level requirements, Program requirements, and Unrestricted Electives. The 3 categories of requirements mentioned each have sub-categories. For example, University-level requirements consist of General Education Modules (GEM), Singapore Studies (SS), and Breadth modules. A Breadth module is any module which is not from a student's home faculty. Students have to fulfil the specific MC requirements pertaining to all 3 categories in order to graduate. The degree requirements are set centrally by NUS, and all students belonging to FASS, FoE, FoS, BIZ, and SoC largely follow a common degree requirement structure.

In 2007, the university revised its University-level requirement for the honors degree so that newly admitted students from the 2007 admission cohort and onwards would only be required to read 8 MC instead of 16 MC worth of modules to fulfill the Breadth requirement. This revision was unanticipated and occurred because NUS wanted to align the University-level requirements for its honors (four-year) and non-honors (three-year) programs so that they would be identical. In response to this, there was some heterogeneity in how faculties allocated the additional 8 MC. While FASS increased their major requirement, thereby compelling students to read a greater share of modules in their major discipline, other faculties, specifically FoE, FoS, BIZ, and SoC, increased their Unrestricted Elective (UE) requirement instead, so that students were effectively allowed to choose whatever modules they wished to read to fulfill the additional 8 MC.[1] As a result of these changes, students admitted to FASS in and after 2007 (i.e. post-2007 admission cohorts) were treated with a reduction in their curriculum breadth compared to students admitted to FASS prior to 2007 (i.e. pre-2007 admission cohorts).[2]

---

[1] The major requirement for FASS increased by a total of 12 MC in 2007 (of which 8 MC came from the decrease in Breadth requirement). In-depth details concerning the changes in graduation requirements can be found in Seah, Pan and Tan (2020).

[2] Appendix Figure A1 shows how the fraction of major modules, fraction of modules outside the major but within the faculty, and fraction of modules both outside the major and faculty, evolved over the 2005 and 2008 admission

This, coupled with the idiosyncratic difference in curricular choices made by FASS and the other faculties, provides a unique opportunity for us to investigate the impact of a reduction in curriculum breadth on students' subsequent labor market outcomes.[3] We refer interested readers to Seah, Pan and Tan (2020) for more in-depth information on the various categories of requirements that students had to fulfill to graduate (i.e. degree requirement structure) and how these requirements changed from 2007.

Because the types of students that select into different faculties may differ, simply comparing the labor market outcomes of the post-2007 admission cohorts from FASS and the other faculties (FoE, FoS, BIZ, and SoC) will likely not reveal reliable estimates of the causal effect of curriculum breadth. We therefore compare how the outcomes between the pre-2007 and the post-2007 admission cohorts from FASS changed, taking the change in outcomes between the pre-2007 and the post-2007 admission cohorts from the other faculties as counterfactuals. In other words, the change in outcomes between the pre-2007 and the post-2007 admission cohorts of the other faculties approximates how outcomes would have changed between the pre-2007 and the post-2007 admission cohorts of FASS, had FASS not increased its major requirements. We limit the comparison faculties to FoE, FoS, BIZ, and SoC because these faculties shared a largely common set of requirements for graduation (with the exception of the above-mentioned 2007 change).

3.   Data

Our main analysis sample is based on students who were admitted to NUS between 2005 and 2008 (i.e. admission cohorts 2005-2008).[4] As mentioned, we limit the sample to students from the five largest faculties of FASS, FoE, FoS, BIZ, and SoC because, apart from the 2007 change, these five faculties shared a common set of requirements for graduation and are therefore comparable in terms of curriculum structure. Further, we limit the sample to only honors students since the 2007 curricular change affected only the graduation requirements for the honors degree.

The data used in this study comes from two sources. Student-level information on socio-demographic characteristics (specifically, birth year, gender, race, and residency status), pre-university characteristics (specifically, academic achievement prior to entering university and entry route into university), and university-level characteristics (specifically, year of

---

cohorts for FASS and the other faculties. As can be seen, there was a marked increase in the share of major modules read by FASS cohorts after the 2007 reform. On the other hand, post-2007 cohorts from the other faculties appear to have kept the share of major modules largely unchanged, instead responding by taking a slightly higher share of modules outside the major but within the faculty. Hence, while students from FASS were taking more major modules after the reform, students from the other faculties were taking more introductory non-major electives offered by their respective faculties after the reform.

[3] It should be noted that an increase in the Unrestricted Elective module requirement does not mean that students *have to* take more courses outside of their major. Rather, it simply gives students more flexibility to take courses outside of their major if they wish and hence provides greater flexibility in increasing curriculum breadth. This is in contrast to an increase in the major requirement, where students are *forced to* take more courses in their major discipline and are hence compelled to reduce their curriculum breadth.

[4] We are only able to include students from the 2005 admission cohort onwards because earnings data could only be matched to those entering from the 2005 admission cohort onwards. Hence, this limits the event-study analysis to just one period pre-reform.

admission, years of enrollment, number of modules taken, faculty and major that the student belonged to, and detailed transcript information showing the modules taken by the student and grades received) were extracted from university administrative records. These student records were merged with annual earnings and job-related data from administrative tax records. Hence, for each student in the sample, we observe annual earnings for the job and the industry in which the student works, every year for up to six years after graduation. The detailed transcript information allows us to compute the share of modules that each student took outside his/her major, and we use this as our measure of curriculum breadth. The greater the share of modules taken outside a student's major, the more diverse the student's coursework was. Table 1 presents descriptive statistics pertaining to the sample.

<Insert Table 1 here>

4. Methodology

To address the bias caused by student self-selection into broader versus narrower curricula, we employ a difference-in-differences approach which exploits the exogenous source of variation in curriculum breadth caused by the 2007 faculty-specific revision of university graduation requirements at NUS. The first difference is between student cohorts admitted to the university before and after the 2007 revision, as only those admitted from 2007 were affected by the reform. The second difference is between the treated faculty (FASS) and the four control faculties (FoE, FoS, BIZ, and SoC) which did not raise their major requirements – indeed, the four control faculties increased their students' curriculum flexibility by increasing the number of unrestricted electives that students were allowed to take, although the students did not significantly increase curriculum breadth in response (Seah, Pan and Tan, 2020). The causal impact of greater specialization in tertiary education is identified using the unaffected faculties as a counterfactual for changes in labor earnings between earlier and later cohorts at the treated faculty (FASS). Seah, Pan and Tan (2020) provide evidence for the plausibility of this assumption by showing that trends in real monthly gross income six months after graduation were very similar for cohorts from the treated faculty and the control faculties prior to the reform. They also show that student demographics in the treated faculty relative to control faculties were largely unaffected by the reform, and that their results were robust to the exclusion of controls, suggesting that the reform did not lead to substantial changes in sorting by faculty. At the institutional level, they argue that the revision was an isolated reform, with no evidence of additional concurrent reforms at FASS that affected teaching inputs such as average module class sizes, relative to other faculties.

The difference-in-differences model is as follows:

$$Y_{it} = \propto + \delta^*_{RF}(Treat_i \times Post_i) + X'_i\beta + \varphi_t + \epsilon_{it} \qquad (1)$$

where Y_{it} denotes labor earnings for individual i in the tax year of assessment t. We consider labor earnings in the second to sixth year after graduation and omit examining data taken from the first year of graduation, as administrative tax records are based on yearly earnings and do not take into account months of employment, which may vary widely for heterogeneous reasons ranging from travelling after graduation to difficulty finding work. That is, for labor

earnings, we estimate five equations, one for each year after graduation (e.g. we estimate one equation for labor earnings in the second year after graduation, and another equation for labor earnings in the third year after graduation, and so on). $Treat_i$ is a dummy variable equal to 1 if the individual was from the affected faculty, FASS, and equal to 0 otherwise, and $Post_i$ is a dummy variable equal to 1 if the individual was admitted after the change in major requirements (i.e. from 2007). X_i is a vector of student socio-demographic characteristics and education-related variables, Specifically, it comprises birth year, gender, race, residency status (citizen, permanent resident, or international), entry route into university (junior college, polytechnic, or international baccalaureate), academic achievement prior to entering university, years of enrollment at NUS, and number of modules taken. Also included in X_i are cohort and faculty fixed effects. φ_t represents fixed effects for year of tax assessment, while ϵ_{it} represents residual noise.[5] Our coefficient of interest is δ_{RF}^*, which is the difference-in-differences estimator of the effect of the reduction in curriculum breadth due to the 2007 policy change on the labor earnings of FASS students. To allow for potential correlation of errors between students from the same faculties and cohorts, we use bootstrapped standard errors clustered at the faculty-cohort level.

Next, to directly estimate earnings as a function of curriculum breadth, we combine our difference-in-differences approach with a two-stage instrumental variable model. The first stage estimates the impact of the reform on curriculum breadth:

$$D_i = \pi + \delta_{FS}^*(Treat_i \times Post_i) + X_i'\rho + \varphi_t + \epsilon_i \qquad (2)$$

where D_i is college curriculum breadth, as measured by the share of modules taken outside a person's major, whilst the other variables are as described above. Here, the key coefficient of interest, δ_{FS}^*, estimates the average impact of the curricular change on the diversity of modules taken. Next, in the second stage, we use the predicted values of D_i from the above model in place of the observed values:

$$Y_{it} = \propto +\delta_{IV}^*\widehat{D}_i + X_i'\beta + \varphi_t + \epsilon_{it} \qquad (3)$$

where the key coefficient of interest, δ_{IV}^*, provides the estimate for curriculum breadth as a causal determinant of earnings, and may be conceptualized as the ratio of δ_{RF}^* to δ_{FS}^*.

Finally, to examine whether individuals who take a broader curriculum have a greater propensity to switch jobs, which may help to explain any differences in earnings trajectories, we repeat the above difference-in-differences analysis, using the probability of job switching between years t and t-1 as the dependent variable. To look further into whether curriculum breadth not only increases the chance of job separation but a wider range of job options, we also examine probability of switching between industries between years t and t-1 as another dependent variable.

---

[5] Cohort and year of tax assessment fixed effects are not collinear and can be separately identified because some students completed the degree requirements earlier/later than expected. Students from the same cohort may enter the workforce in different years.

5.   Results

5.1   Main Results

Because we intend to exploit the sudden and unexpected decrease in curriculum breadth among FASS students driven by the 2007 curricular reform to identify the impact of curriculum breadth on labor market outcomes, we first check to see whether the proportion of modules taken outside major did indeed decrease among FASS students admitted after 2007 relative to those admitted before. Figure 1 (Panel A) shows that this is the case, with the proportion of modules taken outside major exhibiting a discrete and marked fall from around 0.5 for the 2006 FASS admission cohort to only 0.45 for the 2007 FASS admission cohort. The reduction in the proportion of modules taken outside major was then sustained over subsequent cohorts of FASS students. While the proportion of modules taken outside major had already been on a gradual decline since the 2003 FASS admission cohort, the fall between the 2006 and 2007 FASS admission cohorts was notably much more pronounced and plain to see. In contrast, Figure 1 (Panel B) shows that no such fall was seen between the 2006 and 2007 admission cohorts for the other faculties. Instead, the proportion of modules taken outside major remained largely unchanged for these cohorts, at around 0.48. Reassuringly, as with the case of FASS, the proportion of modules taken outside major for the other faculties exhibited a similar gradual decline from the 2003 admission cohort through to the 2006 admission cohort. In sum, for both FASS and the other faculties, we see similar patterns in the proportion of modules taken outside major across the 2003 to the 2006 admission cohorts, with both exhibiting a smooth and gradual declining trend. Right after the introduction of the curricular reform in 2007 however, students admitted to FASS saw a discontinuous reduction in the proportion of modules taken outside major whereas students admitted to the other faculties did not. Following this divergence, the proportion of modules taken outside major for subsequent cohorts then stabilized at roughly 0.450 for FASS and roughly 0.475 for all other faculties.[6]

<Insert Figure 1 here>

Table 2 present estimates of the impact of the reduction in curriculum breadth driven by the 2007 curricular reform on labor earnings. Columns 1 to 5 show results from the instrumental variables (2SLS) model (based on equations 2 and 3), while columns 6 to 10 show results from the reduced form difference-in-differences model (equation 1). The dependent variable used in each column varies. For both models, the first column (i.e. columns 1 and 6) shows the results when log labor earnings two years after graduation is used as the dependent variable, while the second column (i.e. columns 2 and 7) shows the results for log labor earnings three years after graduation. This goes on progressively, where the fifth column (i.e. columns 5 and 10) shows the results for log labor earnings six years after graduation.

---

[6] In Figure 1, we display the trends in the proportion of modules taken outside major for FASS and all other faculties for cohorts admitted in 2003 through to 2010. The intent is to demonstrate that there were no discrete or abrupt changes in the proportion of modules taken outside major for FASS or the other faculties in the time period prior to the curricular reform (i.e. from 2003 to 2006). However, because labor market data for up to six years after graduation is unavailable for cohorts admitted in 2003, 2004, 2009 and 2010, we cannot include these cohorts in our sample. Rather, our sample consists only of cohorts admitted from 2005 to 2008.

The 2SLS estimates from columns 1 to 5 of Table 2 suggest that taking a broader curriculum generally has a positive impact on earnings that grows with time spent in the labor market. A 1 pp increase in college curriculum breadth results in a small (a 0.34 percent increase) and statistically insignificant increase in earnings two years after graduation (column 1), matching up with Seah, Pan, and Tan (2020), who find that curriculum breadth had null effects on the real earnings of students six months after graduation. The returns grow with time to 0.85 percent (significant at the 5% level) in the sixth year after graduation, the last year of data availability. Given that the 2007 increase in FASS major requirements corresponds to a reduction in curriculum breadth of roughly 5 pp (from 0.50 to 0.45), the reform is estimated to have reduced the earnings of affected FASS graduates by about 1.7 percent two years after graduation (insignificant) and by about 4.3 percent six years after graduation. In all 5 regressions, the first stage F-statistic is 107.9, comfortably passing the weak instrument test. The full estimates from the first-stage regression are presented in Appendix Table A1.

<Insert Table 2 here>

To complement the evidence from the IV model, columns 6 to 10 of Table 2 show results from the reduced form difference-in-differences (DID) model. The DID model yields similar findings. The point estimates from the DID model match those from the IV model closely, and they suggest that the 2007 reform reduced the earnings of affected FASS graduates by about 2 percent two years after graduation (insignificant at conventional levels) while growing to about 5 percent six years after graduation (significant at the 10% level).

We also estimate an event study version of equation 1. Specifically, the event study is based on a modified version of equation 1, where the single $Post$ indicator is replaced with a set of admission cohort dummies (with the 2006 admission cohort as the reference group). Each of the admission cohort dummies is then interacted with the $Treat$ indicator. We control for individual-level characteristics including birth year, gender, race, residency status, entry route into university, academic achievement prior to entering university, CAP, years of study at NUS, number of modules taken, faculty fixed effects, cohort fixed effects, and fixed effects for year of tax assessment. Figure 2 plots the coefficients on the $(admission\ cohort \times Treat)$ interaction terms, and show the results when log annual income two years, three years, four years, five years, and six years respectively after graduation is used as the dependent variable. The plots show no evidence of an impact on the earnings of FASS graduates admitted prior to 2007, and negative and significant coefficients on the $(admission\ cohort \times Treat)$ interaction terms when FASS cohorts admitted from 2007 are considered, indicating that the reduction in curriculum breadth affected the earnings of post 2007 FASS cohorts negatively. This pattern can be seen for each set of results (by number of years after graduation) in the figure.[7]

<Insert Figure 2 here>

---

[7] One may be concerned that using log earnings as the dependent variable would lead to unemployed individuals being excluded from the sample, thereby preventing us from identifying effects on the participation margin. In our sample, such concerns matter little as employment is very high, with employment rates each year exceeding 95 percent.

Next, we examine whether individuals with a greater curriculum breadth tend to earn more because reduced specialization enables them to have a more diverse set of skills which can more flexibly respond to shifts in labor market demand, leading to a greater propensity to switch jobs. We repeat the regressions shown in Table 2 but use as our dependent variable a binary variable indicating whether the individual changed jobs in the previous year. The results from this analysis are presented in Table 3. As can be seen, across both models and all columns, there is no evidence (at conventional levels) that greater curricular breadth results in a higher probability of job switching. Unlike for income, the point estimates here are small in magnitude and sometimes positive and other times negative (but always statistically insignificant) and do not exhibit any consistent pattern as we move from the second to the sixth year after graduation. We reach similar results when we consider propensity to switch industries (Table 4).

<Insert Table 3 here>

<Insert Table 4 here>

Figures 3 and 4 show the event study figures when probability of switching job and probability of switching industries is used respectively as the outcome. Similar to Table 3, the results are largely insignificant; where significant, the coefficients, in contrast to the results for earnings, are not consistently in the same direction, and do not correspond to our findings for earnings in terms of effect size or significance. Together, the above results support the interpretation that the lower earnings among the post 2007 FASS cohorts is due to weaker within-firm earnings trajectories among more specialized graduates, rather than a lower propensity to switch jobs or industries.[8]

<Insert Figure 3 here>

<Insert Figure 4 here>

One alternative interpretation of the earnings results is that general and specialized graduates have a similar likelihood of switching jobs, but that the former experiences a large increase in earnings from doing so. To test the plausibility of this interpretation, we re-estimated the regressions in Table 2, conditional on switching jobs. Once we limit comparisons to only graduates who switched jobs, we do not find that breadth of curriculum is associated with higher earnings. The results from these regressions therefore do not support such an interpretation (Table A2).[9]

---

[8] One interesting question is whether more specialized graduates earn less because they enter different firms compared to less specialized graduates (these firms may pay less, hence, the more muted earnings trajectory of more specialized graduates) or because they enter the same firms as less specialized graduates but exhibit weaker earnings trajectories within these firms. We repeated our analysis and restricted our sample to the firms that hired both treated FASS graduates as well as graduates who had not been treated. By restricting the analysis to these firms, we are able to test whether the earnings of more specialized and less specialized graduates follow different trajectories. We continue to find that earnings are lower for more specialized graduates than for less specialized graduates based on this restricted sample, providing support for the interpretation that more specialized graduates have weaker earnings trajectories within firms.

[9] Table A2 presents results for earnings up to 3 years out as the sample sizes get smaller, and associated standard errors get larger, for earnings in the 5th and 6th year after graduation.

An important question is what types of modules were altered by the policy?. We know that the reform led to students from FASS taking more major courses. But exactly what courses did they give up to take more major courses? Did the policy prompt students in FASS to take fewer elective modules outside their home faculty? Did the policy lead to students becoming less likely to develop depth in a second field? To answer these questions, we ran the same regressions as in equation 1, but use as our dependent variable (a) the share of out-of-home-faculty modules taken by the student and (b) whether the student acquired a second major in another discipline. The results from these regressions are reported in Table 5. They suggest that post-2007 FASS cohorts adapted to the increased major requirements by taking fewer introductory courses in completely other fields (courses outside a student's home faculty are typically introductory elective courses). There is no evidence that post-2007 FASS cohorts were less likely to develop depth in a second field (i.e. to acquire a second major).

5.2   Robustness Checks

The validity of the estimates from our difference-in-differences research design hinges on the assumption that changes in the labor market outcomes of the pre and post 2007 cohorts in the other faculties represent how the labor market outcomes of the pre and post 2007 cohorts in FASS would have changed in the absence of the increase in major requirements. Hence, it is important that the 2007 reform did not alter student sorting into faculties or majors. If it did, then our estimates would be partly picking up this sorting behavior rather than truly reflect the causal effect of curriculum breadth. To assess whether the reform led to differential changes in the type of student being admitted to FASS vis-a-vis the other faculties, we ran the same regressions as in equation 1 but used as the dependent variable a variety of pre-determined student characteristics (gender, race, residency, entry route, and university admission score). Table 6 reports the results of these regressions and shows that none of the pre-determined student characteristics changed at FASS after the 2007 reform relative to the other faculties. Hence, our estimates are unlikely to be confounded by differential changes in the types of students entering FASS vis-a-vis those entering the other faculties after the reform. We also repeated the regressions in Tables 2, 3, and 4 without controlling for student characteristics and found the estimates to be very similar whether or not these controls were included.

As a robustness check, we also ran the event study results when we expand the cohorts used from 2005-2008 to 2005-2010 (Appendix Figure A2). When we do this however, we are only able to evaluate the impacts on labor market earnings up to 4 years out. As with the results using the 2005-2008 cohorts, we continue to find the same patterns – earnings were negatively impacted for post 2007-FASS cohorts. The event study continues to support the parallel trends assumption.

6.   Conclusion

What are the labor market implications of reading a more specialized curriculum in college as opposed to a broader-based one, and do these effects change with time spent in the

labor market? In this paper, we attempt to answer this question by exploiting a university-wide revision in curriculum requirements, using individual-linked administrative university and tax records up to six years after graduation. The results show that the negative impact of a more specialized curriculum increases and becomes statistically significant with time spent in the labor market. The lower earnings are due to weaker within-firm earnings trajectories among more specialized graduates, suggesting that a more diverse build of skills which come with a broader curriculum could open doors to a wider range of job options or opportunities within a firm, thereby facilitating career advancement. Our results have important implications for the design of tertiary level curriculum and for higher education policy in general.

One caveat to our results is that it may be difficult to generalize beyond the context studied. In this paper, we focused on evaluating the effect of curricular breadth on the labor market outcomes of graduates from one of the largest university faculties, which may be different for graduates from other faculties (such as highly specialized fields like Medicine or Law, for instance). However, the paper provides valuable evidence that curricular breadth does significantly influence medium-term labor market outcomes, at least under certain contexts, and particularly in less specialized fields. This is an important insight, given the scarcity of evidence in the literature.

Acknowledgements

References

Brunello, Giorgio and Rocco, Lorenzo (2017). The labor market effects of academic and vocational education over the life cycle: Evidence based on a British cohort. *Journal of Human Capital*, 11(1), 106-166.

Bordon, Paola and Fu, Chao. (2015) College-major choice to college-then-major choice. *Review of Economic Studies*, 82(4), 1247-1288.

Deming, David J. and Noray, Kadeem (2020). Earnings dynamics, changing job skills, and stem careers. *Quarterly Journal of Economics*, 135(4), 1965-2005.

Golsteyn, Bart H. and Stenberg, Anders (2017). Earnings over the life course: General versus vocational education. *Journal of Human Capital*, 11(2), 167-212.

Hall, Caroline. (2012) The effects of reducing tracking in upper secondary school: Evidence from a large-scale pilot scheme. *Journal of Human Resources*, 47(1), 237-269.

Hall, Caroline. (2016) Does more general education reduce the risk of future unemployment? Evidence from an expansion of vocational upper secondary education. *Economics of Education Review*, 52(C), 251-271.

Hampf, Franziska and Woessmann, Ludger. (2017). Vocational vs. general education and employment over the life cycle: New evidence from PIAAC. *CESifo Economic Studies*, *63*(3), 255-269.

Hanushek, Eric A., Schwerdt, Guido, Woessmann, Ludger, and Zhang, Lei. (2017). General education, vocational education, and labor-market outcomes over the lifecycle. *Journal of Human Resources*, 52(1), 48-87.

Herz, Benedikt. (2019) Specific human capital and wait unemployment. *Journal of Labor Economics*, 37(2), 467-508.

Lazear, Edward P. (2005) Entrepreneurship. *Journal of Labor Economics*, 23(4), 649-680.

Malamud, Ofer and Pop-Eleches, Cristian. (2010) General education versus vocational training: Evidence from an economy in transition. *Review of Economics and Statistics*, 92(1), 43-60.

Malamud, Ofer. (2011) Discovering one's talent: Learning from academic specialization. *Industrial and Labor Relations Review*, 64(2), 375-405.

McGuinness, Seamus, Konstantinos Pouliakas, and Paul Redmond (2021) Skills-displacing technological change and its impact on jobs: challenging technological alarmism?, *Economics of Innovation and New Technology*, 32(3), 370-392.

Oosterbeek, Hessel and Webbink, Dinand. (2007) Wage effects of an extra year of basic vocational education. *Economics of Education Review*, 26(4), 408-419.

Seah, Kelvin, Pan, Jessica, and Tan, Poh Lin. (2020) Breadth of university curriculum and labor market outcomes. *Labour Economics*, 65, Article 101873.

Silos, Pedro and Smith, Eric. (2015) Human Capital Portfolios. *Review of Economic Dynamics*, 18(3), 635-652.

Verhaest, Dieter., Lavrijsen, Jeroen., Van Trier, Walter, Nicaise, Ides, and Omey, Eddy. (2018). General education, vocational education and skill mismatches: Short-run versus long-run effects. *Oxford Economic Papers*, 70(4), 974-993.

Figure 1: Proportion of modules taken outside major, admission cohorts 2003-2010

FASS

Non-FASS
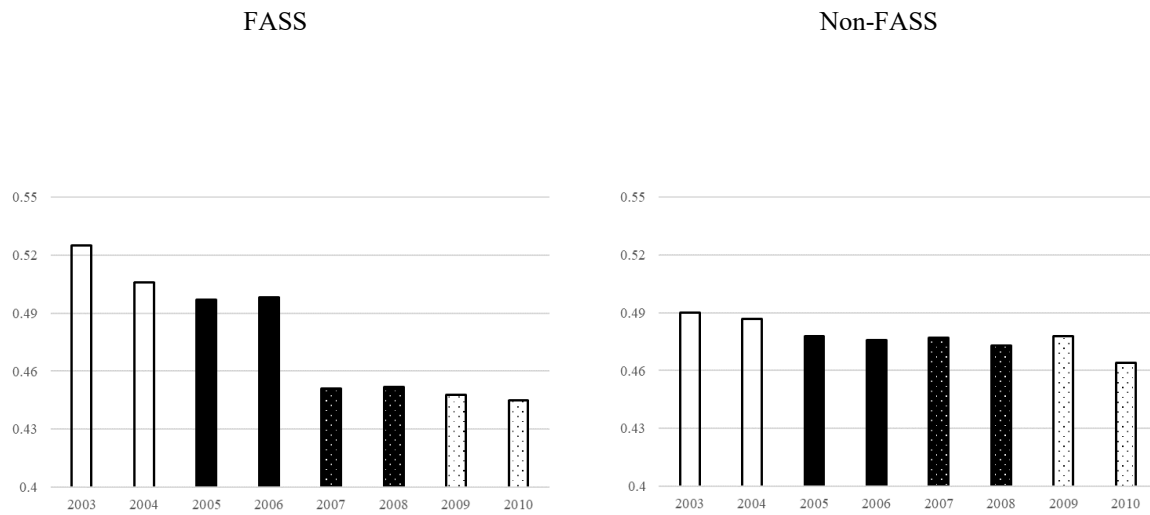
Notes: Light bars refer to years which are not included in the sample, while dark bars refer to years included in the sample; solid bars refer to those prior to the curricular reform, while dotted bars refer to those after the curricular reform.

Figure 2: Effect of the curricular reform on log earnings after graduation: OLS event study

Notes: The figure plots the coefficients from the OLS event study. The dependent variables are the logarithm of real annual earnings between two and six years after graduation. We control for individual-level characteristics including birth year, gender, race, residency status, entry route into university, academic achievement prior to entering university, CAP, years of study at NUS, number of modules taken, faculty fixed effects, cohort fixed effects, and fixed effects for year of tax assessment. The horizontal lines are the estimated coefficients on the (admission cohort × Treat) interaction terms. The vertical capped lines show the 95% confidence interval based on bootstrapped standard errors. The 2006 admission cohort serves as the reference group.

Figure 3: Effect of the curricular reform on probability of switching jobs: OLS event study
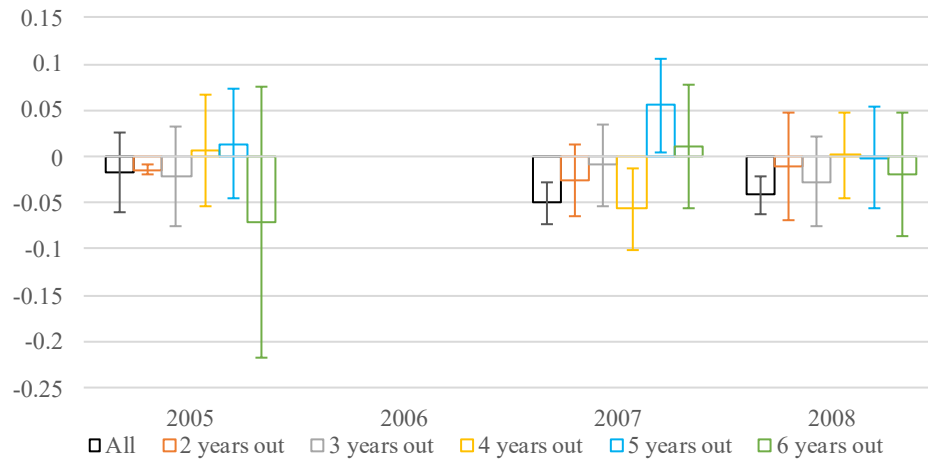
Notes: The figure plots the coefficients from the OLS event study. The dependent variables are the probability of switching jobs between two and six years after graduation. We control for individual-level characteristics including birth year, gender, race, residency status, entry route into university, academic achievement prior to entering university, CAP, years of study at NUS, number of modules taken, faculty fixed effects, cohort fixed effects, and fixed effects for year of tax assessment. The horizontal lines are the estimated coefficients on the (admission cohort × Treat) interaction terms. The vertical capped lines show the 95% confidence interval based on bootstrapped standard errors. The 2006 admission cohort serves as the reference group.

Figure 4: Effect of the curricular reform on probability of switching industry: OLS event study
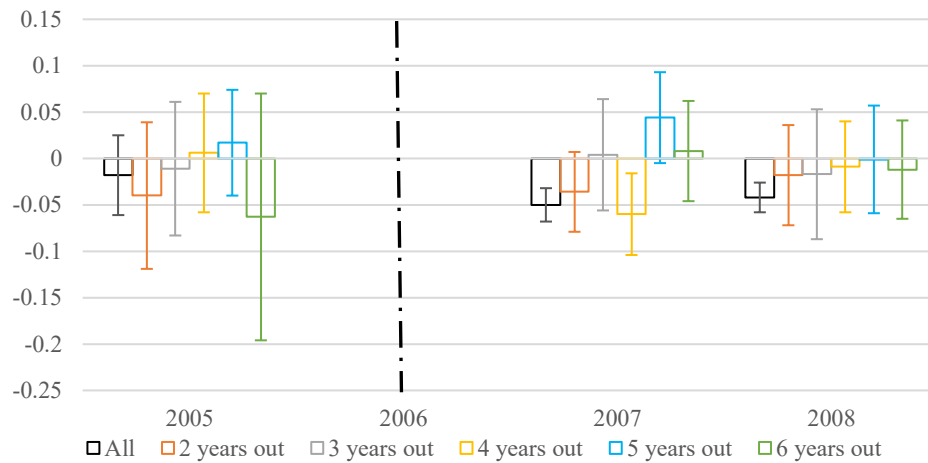

Notes: The figure plots the coefficients from the OLS event study. The dependent variables are the probability of switching industry between two and six years after graduation. We control for individual-level characteristics including birth year, gender, race, residency status, entry route into university, academic achievement prior to entering university, CAP, years of study at NUS, number of modules taken, faculty fixed effects, cohort fixed effects, and fixed effects for year of tax assessment. The horizontal lines are the estimated coefficients on the (admission cohort × Treat) interaction terms. The vertical capped lines show the 95% confidence interval based on bootstrapped standard errors. The 2006 admission cohort serves as the reference group.

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Sample Size
Female	0.488	0.500	5,105
Junior college	0.886	0.317	5,105
Polytechnic	0.113	0.316	5,105
International baccalaureate	0.001	0.031	5,105
University admission score (UAS)	0.310	0.967	5,105
Cumulative average point (CAP)	3.934	0.361	5,105
Years of study	3.970	0.323	5,105
Number of modules taken	37.795	3.555	5,105
Admission cohort	2006.533	1.105	5,105
Year of birth	1986.370	1.663	5,105
Year of tax assessment	2011.547	1.167	5,105
Log(real income)	10.815	0.253	5,105
Fraction of modules outside major	0.458	0.087	5,105

Notes: Means and standard deviations of the various race categories and residency status categories are not available under the terms of the data access agreement.

Table 2: Effect of curriculum breadth on earnings after graduation: 2SLS and reduced form DID model results

Dependent Variable	2SLS Log(annual income) after graduation					Reduced form Log(annual income) after graduation				
	2 years	3 years	4 years	5 years	6 years	2 years	3 years	4 years	5 years	6 years
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fraction of modules outside major	0.337	0.598**	0.735***	0.761**	0.850**					
	(0.210)	(0.286)	(0.272)	(0.357)	(0.386)					
Treatment (FASS)*Post						-0.019	-0.034	-0.041**	-0.043**	-0.048*
						(0.014)	(0.021)	(0.018)	(0.022)	(0.028)
Controls:										
Demographic characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
gender, race, residency status, birth year FE										
Pre-university characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
entry route, university admission score										
University level characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CAP, number of modules, years of study										
admission year FE, faculty FE										

Year of tax assessment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-Statistic	107.9	107.9	107.9	107.9	107.9					
Observations	5,105	5,105	5,105	5,105	5,105	5,105	5,105	5,105	5,105	5,105

Notes: Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of students from the 2005 to 2008 admission cohorts. Demographic controls include student gender, race, residency status, and birth year fixed effects. Pre-university characteristic controls include the route through which the student entered university and university admission score (UAS). University level characteristic controls include university cumulative average point (CAP), number of modules read in university, years of study in university, admission year fixed effects, and faculty fixed effects. All regressions include year of tax assessment fixed effects. *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 3: Effect of curriculum breadth on propensity to switch jobs after graduation: IV and reduced form DID model results

Dependent Variable	2SLS					Reduced form				
	Student changed job in the second year after graduation (1=yes)	Student changed job in the third year after graduation (1=yes)	Student changed job in the fourth year after graduation (1=yes)	Student changed job in the fifth year after graduation (1=yes)	Student changed job in the sixth year after graduation (1=yes)	Student changed job in the second year after graduation (1=yes)	Student changed job in the third year after graduation (1=yes)	Student changed job in the fourth year after graduation (1=yes)	Student changed job in the fifth year after graduation (1=yes)	Student changed job in the sixth year after graduation (1=yes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fraction of modules outside major	0.197	0.140	0.557	-0.371	-0.519					
	(0.442)	(0.336)	(0.534)	(0.467)	(0.630)					
Treatment (FASS)*Post						-0.011	-0.008	-0.032	0.021	0.029
						(0.025)	(0.020)	(0.034)	(0.028)	(0.045)
Controls:										
Demographic characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
gender, race, residency status, birth year FE										
Pre-university characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
entry route, university admission score										
University level characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CAP, number of modules, years of study										

admission year FE, faculty FE

Year of tax assessment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-Statistic	109.9	106.9	107.1	107.4	114.5					
Observations	5,001	4,999	5,002	4,975	4,891	5,001	4,999	5,002	4,975	4,891

Notes: Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of students from the 2005 to 2008 admission cohorts. Demographic controls include student gender, race, residency status, and birth year fixed effects. Pre-university characteristic controls include the route through which the student entered university and university admission score (UAS). University level characteristic controls include university cumulative average point (CAP), number of modules read in university, years of study in university, admission year fixed effects, and faculty fixed effects. All regressions include year of tax assessment fixed effects. *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 4: Effect of curriculum breadth on propensity to switch industries after graduation: IV and reduced form DID model results

Dependent Variable	2SLS					Reduced form				
	Student changed industry in the second year after graduation (1=yes)	Student changed industry in the third year after graduation (1=yes)	Student changed industry in the fourth year after graduation (1=yes)	Student changed industry in the fifth year after graduation (1=yes)	Student changed industry in the sixth year after graduation (1=yes)	Student changed industry in the second year after graduation (1=yes)	Student changed industry in the third year after graduation (1=yes)	Student changed industry in the fourth year after graduation (1=yes)	Student changed industry in the fifth year after graduation (1=yes)	Student changed industry in the sixth year after graduation (1=yes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fraction of modules outside major	0.150	0.015	0.661	-0.254	-0.484					
	(0.496)	(0.368)	(0.488)	(0.434)	(0.560)					
Treatment (FASS)*Post						-0.008	-0.001	-0.037	0.014	0.027
						(0.030)	(0.022)	(0.031)	(0.025)	(0.040)
Controls:										
Demographic characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
gender, race, residency status, birth year FE										
Pre-university characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
entry route, university admission score										
University level characteristics:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CAP, number of modules, years of study										

admission year FE, faculty FE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Year of tax assessment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-Statistic	109.9	106.9	107.1	107.4	114.5					
Observations	5,001	4,999	5,002	4,975	4,891	5,001	4,999	5,002	4,975	4,891

Notes: Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of students from the 2005 to 2008 admission cohorts. Demographic controls include student gender, race, residency status, and birth year fixed effects. Pre-university characteristic controls include the route through which the student entered university and university admission score (UAS). University level characteristic controls include university cumulative average point (CAP), number of modules read in university, years of study in university, admission year fixed effects, and faculty fixed effects. All regressions include year of tax assessment fixed effects. *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 5: What courses did FASS students do less in order to take more major courses?

| Dependent Variable	(1) Share of out-of-home-faculty modules taken by student	(2) Whether student had a second major
Treatment (FASS)*Post	-0.024***	0.005
	(0.006)	(0.008)
Observations	5,105	5,105
R-squared	0.758	0.095

Notes: Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of honors students from the 2005 to 2008 admission cohorts. Controls include student gender, race, residency status, and birth year, the route through which the student entered university, and university admission score (UAS). *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 6: Estimates of differential changes in the characteristics of students entering FASS versus the other faculties after the reform

| Dependent Variable	(1) Female	(2) Majority race	(3) Singaporean resident	(4) Junior college entry route	(5) Standardised UAS
Treatment (FASS)*Post	0.011	0.025	-0.021	-0.016	-0.026
	(0.022)	(0.024)	(0.019)	(0.011)	(0.042)
Observations	5,105	5,105	5,105	5,105	5,105
R-squared	0.691	0.119	0.353	0.496	0.220

Notes: Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of honors students from the 2005 to 2008 admission cohorts. Unless the dependent variable happens to be the characteristic, controls include student gender, race, residency status, and birth year, the route through which the student entered university, and university admission score (UAS). *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Online Appendix Figure A1: Evolutions of fraction of major modules, fraction of modules outside the major but within the faculty, and fraction of modules both outside the major and faculty, for FASS and the other faculties
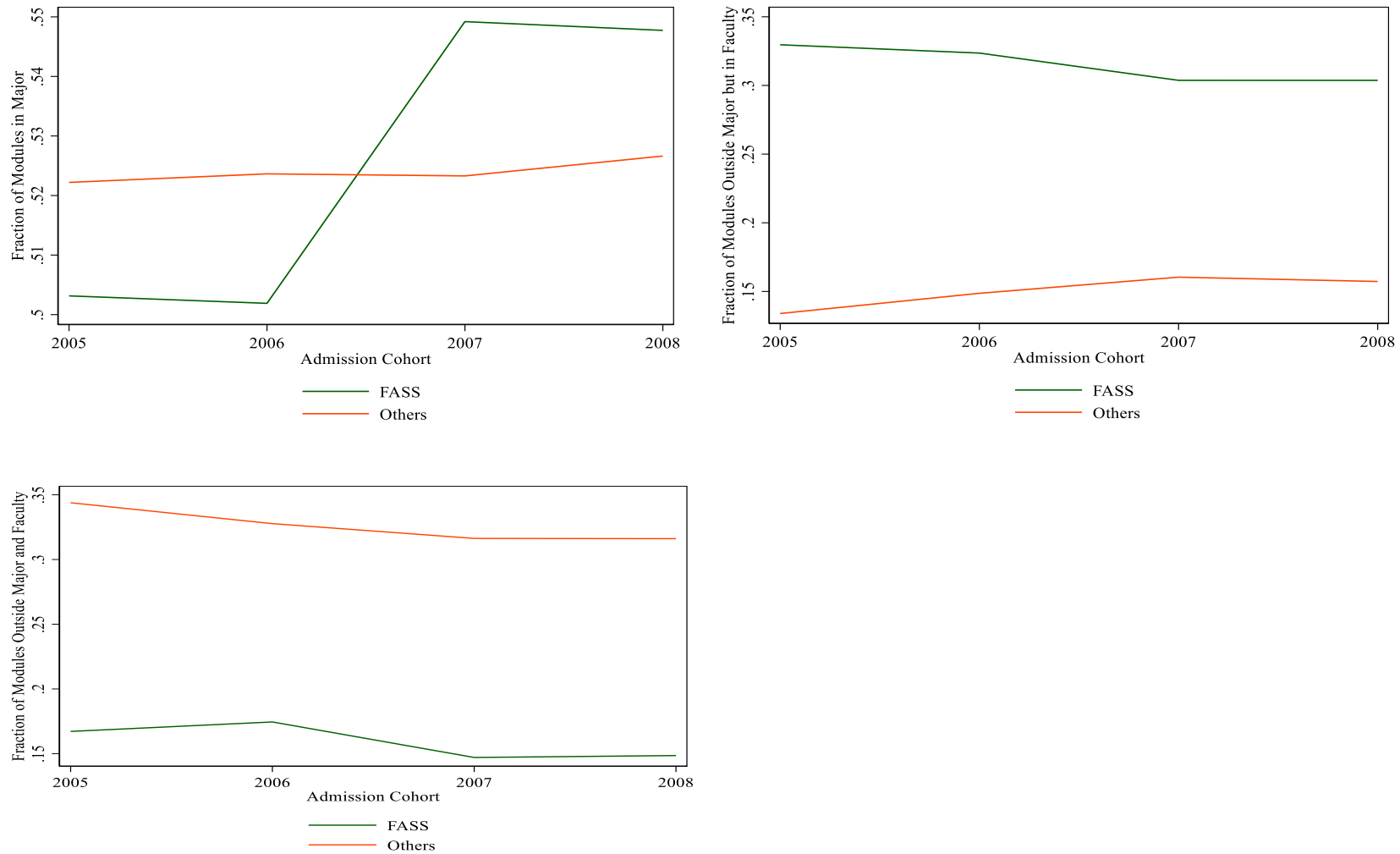
Online Appendix Figure A2: Effect of the curricular reform on log earnings after graduation: OLS event study (cohorts expanded to 2005-2010)
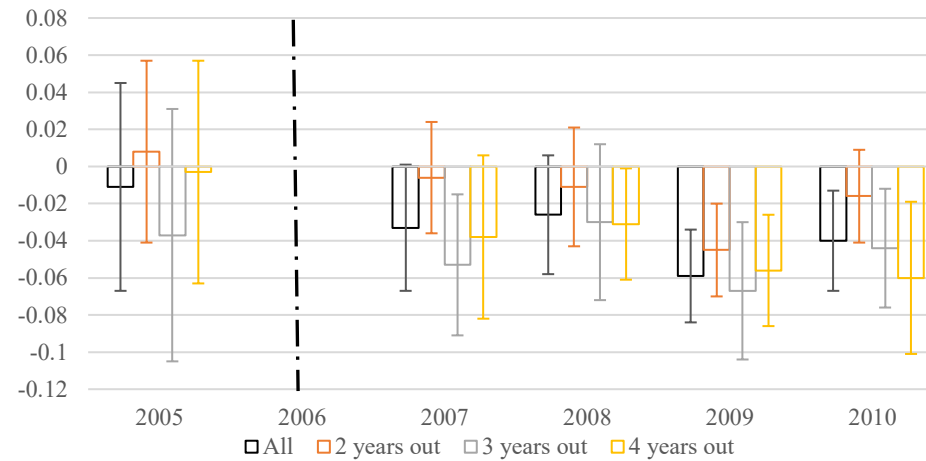
Notes: The figure plots the coefficients from the OLS event study for cohorts 2005-2010. The dependent variables are the logarithm of real annual earnings between two and four years after graduation. We control for individual-level characteristics including birth year, gender, race, residency status, entry route into university, academic achievement prior to entering university, CAP, years of study at NUS, number of modules taken, faculty fixed effects, cohort fixed effects, and fixed effects for year of tax assessment. The horizontal lines are the estimated coefficients on the (admission cohort × Treat) interaction terms. The vertical capped lines show the 95% confidence interval based on bootstrapped standard errors. The 2006 admission cohort serves as the reference group.

Online Appendix Figure A3: Log(real monthly income six months after graduation) of treatment group relative to the control group, controlling for individual level characteristics
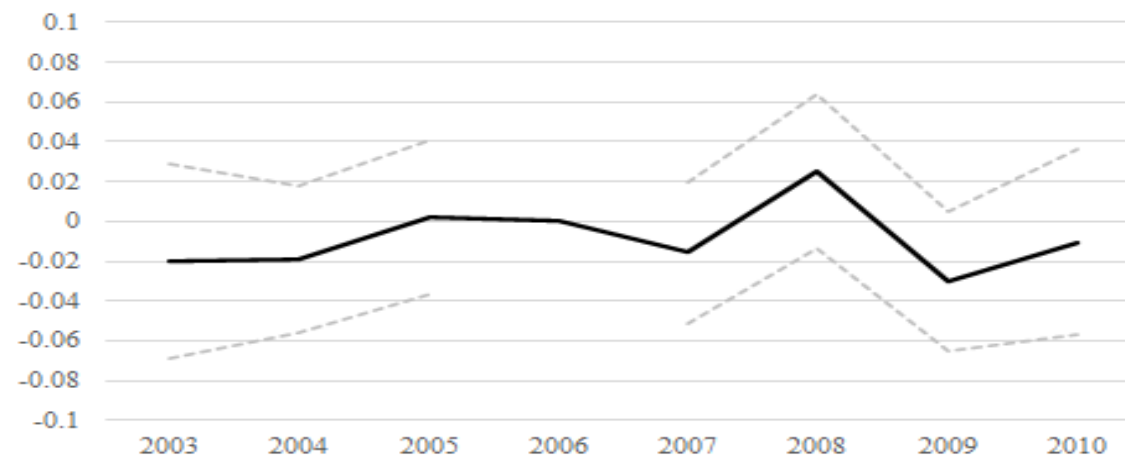
Notes: This figure is taken from Figure 3 (Panel A) of Seah, Pan, and Tan (2020). It plots the coefficients from the OLS event study over a longer period (2003-2010). The dependent variable is the logarithm of real monthly earnings six months after graduation. We control for individual-level characteristics including birth year, gender, race, residency status, entry route into university, academic achievement prior to entering university, CAP, years of study at NUS, number of modules taken, faculty fixed effects, and cohort fixed effects. Solid lines refer to coefficient estimates for differences in cohort fixed effects between FASS and non-FASS students relative to 2006, and dotted lines refer to the 95% confidence interval.

Online Appendix Table A1: First stage
regression estimates for regressions in Table 2

Dependent Variable	Fraction of modules outside major
	(1)
Treatment (FASS)*Post	-0.056***
	(0.010)
Female	0.001
	(0.002)
Indian	0.004
	(0.003)
Malay	0.005
	(0.004)
Others	-0.003
	(0.006)
Permanent resident	-0.006*
	(0.004)
International	0.003
	(0.003)
Polytechnic	-0.058***
	(0.008)
International baccalaureate	0.012
	(0.012)
University admission score (UAS)	-0.001
	(0.001)
Cumulative average point (CAP)	0.004*
	(0.002)
Years of study	0.013
	(0.008)
Number of modules taken	-0.001**
	(0.000)
Observations	5,105

Notes: The dependent variable is the fraction of modules taken outside a person's major. Column (1) reports the first stage regression for the regressions in columns (1) to (5) of Table 2. Note that the first stage for all 5 regressions are necessarily the same. Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of students from the 2005 to 2008 admission cohorts. All regressions include birth year fixed effects, admission year fixed effects, faculty fixed effects, and year of tax assessment fixed effects. *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Online Appendix Table A2: Effect of curriculum breadth on earnings after graduation: 2SLS and reduced form DID model results conditional on switching jobs within 6 years after graduation

Dependent Variable	2SLS			Reduced form		
	Log(annual income) after graduation			Log(annual income) after graduation		
	2 years	3 years	4 years	2 years	3 years	4 years
	(1)	(2)	(3)	(4)	(5)	(6)
Fraction of modules outside major	0.316	0.306	-0.273			
	(0.599)	(0.864)	(0.623)			
Treatment (FASS)*Post				-0.017	-0.016	0.017
				(0.028)	(0.028)	(0.041)
Controls:						
Demographic characteristics:	Yes	Yes	Yes	Yes	Yes	Yes
gender, race, residency status, birth year FE						
Pre-university characteristics:	Yes	Yes	Yes	Yes	Yes	Yes
entry route, university admission score						
University level characteristics:	Yes	Yes	Yes	Yes	Yes	Yes
CAP, number of modules, years of study						
admission year FE, faculty FE						
Year of tax assessment	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-Statistic	27.28	27.04	41.24			
Observations	1,553	1,520	1,480	1,553	1,520	1,480

Notes: Bootstrapped standard errors, clustered at the faculty-cohort level, are shown in parentheses. The sample consists of students from the 2005 to 2008 admission cohorts who changed job at least once within 6 years after graduation. Demographic controls include student gender, race, residency status, and birth year fixed effects. Pre-university characteristic controls include the route through which the student entered university and university admission score (UAS). University level characteristic controls include university cumulative average point (CAP), number of modules read in university, years of study in university, admission year fixed effects, and faculty fixed effects. All regressions include year of tax assessment fixed effects. *** p-value<0.01, ** p-value<0.05, * p-value<0.1.