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Vocational Schools and Labour Market: Insights from Indonesia

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Abstract

This article examines the differentiated outcomes of vocational and general secondary academic education, particularly in terms of employment opportunities, labour market earnings, and access to tertiary education in Indonesia. With data from a panel of two waves of the Indonesia Family Life Survey in 1997 and 2000, the article tracks a cohort of high school students in 1997 to examine their schooling and employment status in 2000. The findings demonstrate that: (1) attendance at vocational secondary schools results in neither market advantage nor disadvantage in terms of employment opportunities and/or premium earnings; (2) attendance at vocational schools leads to significantly lower academic achievement as measured by national test scores; and (3) there is no stigma attached to attendance at vocational schools that results in a disadvantage in access to tertiary education; rather, it is the lower academic achievement associated with attendance at vocational school that lowers the likelihood of entering college.

Keywords: vocational education, labour market, vocational education

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1. Introduction

The empirical approach of this article addresses two limitations of the existing literature in this area. First, it considers the observation censoring issue due to college entry when evaluating labour market outcomes of secondary school graduates. Second, using an instrumental variable approach, the article also treats endogeneity of household choice of vocational versus academic track of secondary education, teasing out the net effect of secondary school choice on labour market and schooling outcomes.

Despite an extensive volume of research into the subject, the debate regarding the benefits of vocational education as opposed to general academic education is not conclusive. The arguments against vocational education usually fall into two categories: either that vocational education has a lower benefit–cost ratio (the economists' argument); or that it inhibits the future socioeconomic attainment of students by reducing

students' access to tertiary education and subsequently gaining entry to the professions and other high-prestige occupations (the educators' and sociologists' argument).

Summarizing research findings from Colombia, Tanzania, Kenya, Mexico, Jordan, Sri Lanka, India, Barbados, Swaziland, El Salvador, Brazil, Nigeria, and Somalia, Psacharopoulos (1987) argues that "the costs of vocational programs are considerably higher than general education, while their benefits are comparable." He questions the value of providing vocational instruction through the mainstream educational system and explores more efficient alternatives, such as employment-based training. In the context of the New Economy, an article titled 'Training for Jobs' in a1994 issue of the Economist magazine stated that:

Economists have long argued that the returns on general education are higher than those on specific training, because education is transferable whereas many skills tend to be job-specific. Today this case is becoming more compelling still as jobs become less secure, the service sector expands and the lift cycle of vocation skill diminishes and the market puts an even greater premium on the ability of dealing with people and process information.

The educators' and sociologists' arguments are well summarized by Arum and Shavit (1995). They argue that vocational education "inhibits the future socioeconomic attainment of students and reduces students' chances of attending college and of subsequently gaining entry to the professions and other high-prestige occupations." One reason for this is that vocational programs are usually less selective and represent the least prestigious of high school tracks. This can bring a certain degree of stigma that may lead to discrimination when candidates compete for limited access to higher education. The alternative argument is that vocational schooling's overall objective may restrict access to higher education because:

1. They offer a more restrictive curriculum with less emphasis on advanced core subjects, such as math and science, and result in a lower level of achievement in standardized test for selection into higher education;

2. Achievement at vocational schools may be negatively affected due to an environment in which there are fewer highly motivated peers;

3. The perception that vocational schools are less prestigious dampens expectations and aspirations;

4. Less classroom time is allocated to core cognitive skills; and

5. Generally, less experienced and effective teachers are employed at vocational schools.

Overall, the argument is that vocational schools are not designed or intended to prepare students for college. Therefore, they actively reproduce inequities, particularly as they generally attract students from lower socioeconomic strata.

However, there are also strong counter-arguments in favour of vocational education. In particular, some studies find that the benefit–cost ratio of vocational schooling is higher than for general education; and that it provides a safety net for members of disadvantaged groups by reducing their risk of failing to achieve employability.

Neuman and Ziderman (1989) examine the labour market outcomes associated with vocational school education in Israel, comparing these with outcomes associated with academic schools. Using data from the 1983 population census, the study shows vocational schooling (which accounts for half of the secondary school enrolment in Israel) to be more cost-effective than general school education. Specifically, they find that students who complete vocational school and work in occupations related to the course of study pursued at school earn up to 10 percent annually more than their counterparts who attended general education.

Using data from the American 'The High School and Beyond', Arum and Shavit (1995) find that although vocational education inhibits students' likelihood of attending college and subsequently of finding employment in the professions and managerial occupations, it reduces the overall risk of unemployment. They conclude that for students who are unlikely to continue on to college, vocational education is a safety net that reduces the risk of failing to achieve employability.

The somewhat contradictory conclusions reached in the existing literature are to some extent related to the methodologies employed in the various studies. There are two common limitations in existing empirically based studies: The first limitation is when only terminal education level is used for sample selection. Thus, the samples used usually include only students who conclude their education at secondary level (whether in the academic track or vocational track), disregarding students who pass through secondary education to achieve a higher level of educational attainment. If achieving a higher level of educational attainment leads to better labour market outcomes, the data censoring could lead to biased results by overestimating the benefit of vocational education. The second limitation is related to the endogeneity of being in academic or vocation track of education. These two limitations are usually related to the lack of longitudinal information.

In some cases, longitudinal information is used for analysing the effect of vocational versus general schooling, but only for observing changing labour market outcomes over time, such as in and out of employment status and trend in labour market earnings [7, 14, 15]. Seldom is longitudinal data available in tracking the household decision of choosing vocational or general track of schooling; nor is it used for correcting data censoring bias. In the meantime, other areas of empirical research have shown that treatment for data censoring and endogeneity of schooling choice can indeed bring improvement in econometric estimates. Examples include Evans and Schwab (1995) on the effect of attending catholic schools on high school graduation and college entry correcting for schooling choice endogeneity, and Van de Ven and Praag (1981) on demand for deductibles in private health insurance correcting for data censoring due to health insurance coverage.

This article examines the differentiated outcomes in the Indonesian context of vocational education and academic education, particularly in terms of employment opportunities; labour market earnings; and access to tertiary education. It attempts to explain these differentiated outcomes by exploring whether vocational education is regarded by employers, educational institutions and other stakeholders as less prestigious and is thus stigmatized; or whether vocational education's characteristics and quality is responsible for these differentiated outcomes. With data from a panel of two waves of 'Indonesia Family Life Survey' (IFLS II and IFLS III) in 1997 and 2000, the empirical approach adopted takes into account the observation censoring problem related to disregarding students who pass through secondary education to achieve a higher level of educational attainment. Using an instrumental variable, this article will also treat the endogeneity of household choice of vocational versus academic track of education. Both of these estimation issues have not been addressed in the existing literature on this subject so far.

1.1. Indonesian context

1.1.1. Increasing the proportion of vocational students: A laudable and realistic goal?

As a sub-system in Indonesia's national education system, technical and vocational education has always played a crucial role in creating skilled human resources. At the senior secondary level, on average between one-fifth and one-quarter of enrolled students study at vocational schools (*Sekolah Menengah Kejuruan*, SMK), while the remainder study at general academic schools (*Sekolah Menengah Atas*, SMA). In recent

times, President Joko Widodo has committed to *increase the proportion of vocational school students* to 70% vocational school students and 30% the senior high school students at senior secondary level.

Given the trend in recent years, it seems unlikely that this goal will be achieved. While gross enrolment at the senior secondary level has been increasing, this increase is largely due to a growth in numbers in students enrolled at general academic schools. Between 2000 and 2006, the gross enrolment rate at SMK has actually declined (Figure 1). As a result, the share of SMK enrolment declined from 27% to 18% (Figure 2).
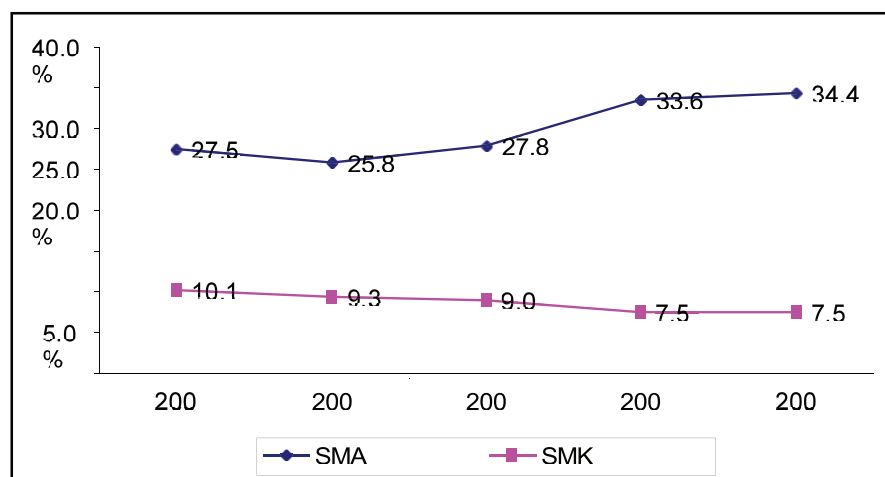
**Figure** 1: GER at senior secondary level: SMA and SMK: 2000–2006. **Source:** Indonesia National Social Economic Survey (SUSENA).
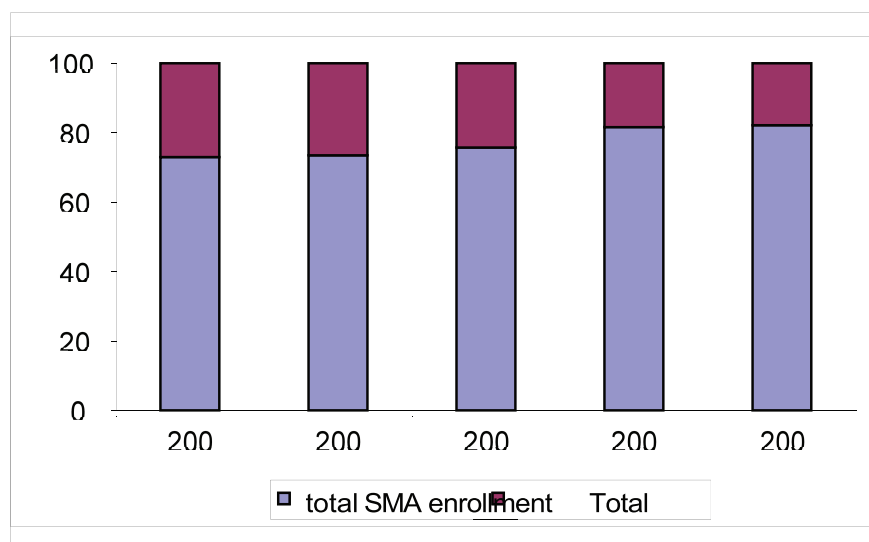
Figure 2: Enrolment share of SMA vs. SMK: 2000–2006. **Source:** Indonesia National Social Economic Survey (SUSENAS).

These *trends toward a declining proportion of students at vocational schools* are also apparently consistent with that of the respective labour market returns for SMK and

SMA graduates. When the terminal level of education of students is the secondary level, while SMK appears to have consistently higher labour market returns than SMA, the difference has been steadily narrowing. The 2007 labor force survey (SAKERNAS) shows that the returns on these two varying types of high school education have actually converged.
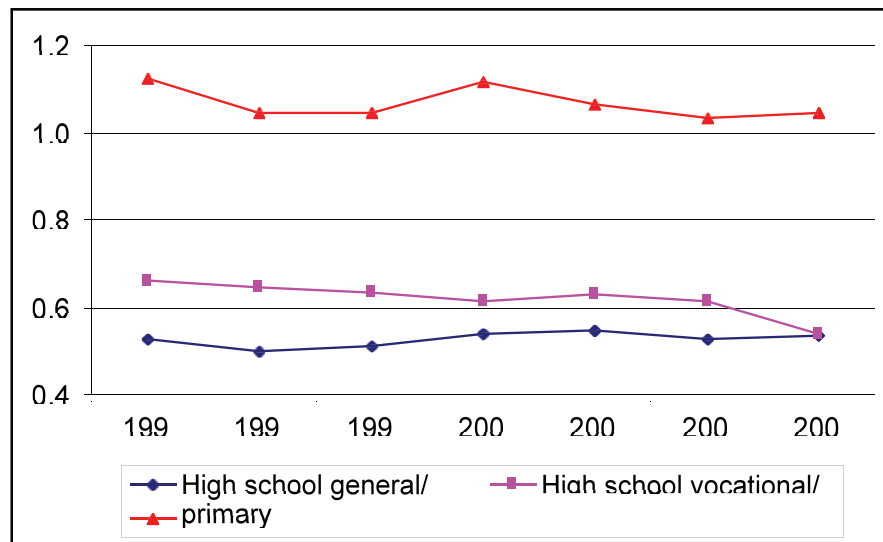
Figure 3: Rates of returns by level of schools (1994–2007). Source: World Bank calculation using Indonesia National Labor Force Survey (SAKERNAS), 1994–2007.

Ultimately, to determine whether striving to increase the proportion of students enrolled at SMK is an appropriate goal for the sector, consideration must be given to two factors. First, the fact that a significant proportion of SMA graduates continue to higher education must be taken into account. The value of an SMA education cannot be measured only by the labour market outcome of those who do not achieve a higher level of attainment.

Second, the question of whether the objective of increasing the proportion of students enrolled at SMK can be achieved will largely depend on the demand-side/ household responses to supply-side policies. Expanding the SMK infrastructure will not automatically lead to increased enrolment. Household choice on the matter of whether to participate in senior secondary education and which track to participate in will also reflect differentiated preferences and expected outcomes resulting from these choices. As the economy grows; as opportunities to participate in tertiary education expand; and as the demand for a higher level of knowledge and skills in the labour market increases, the issue of whether to participate in vocational or general academic secondary level education will also evolve.

Thus, in order to determine whether striving to increase the proportion of students enrolled at SMK is an appropriate goal for the sector, this article attempts to answer the question of how SMK graduates fare after high school compared with SMA graduates, taking into account the aforementioned complexities. Particular attention will be paid to the two key weaknesses of the existing empirical work in this area: the uncorrected data censoring due to the unconsidered impact of participation in tertiary education, and the endogeneity of SMK–SMA choice. The differentiated outcomes of SMA and SMK graduates will be measured by: probability of employment; wage rate; probability of entering college; and value added in cognitive skills or academic achievement.

2. Data

The longitudinal 'Indonesia Family Life Survey' (IFLS) provides a unique opportunity to explore these issues. This article follows a cohort of 958 high school students from the 1997 survey (IFLS2) and looks into their labour market and schooling outcomes in 2000 (IFLS3) (Once the IFLS4 (2008) is released to the public in early 2009, a third observation point can be added to the analysis.). Table 1 depicts the distribution of activities of the 1997 cohort of high-school students in 2000. In 1997, around 40% of the high school students were enrolled in SMK, while the remainder was enrolled in SMA. In 2000, of those who did not go on to tertiary education and who were unemployed, 57% were SMA graduates and 43% were SMK graduates.

However, it should be noted that more than 29% of the sample group participated in tertiary education – but of these, only approximately 20% attended SMK in 1997.

Figure 4 further illustrates the distribution of activities of the 1997 cohort of high-school students in 2000. In 2000, 37% of the 1997 SMA students were participating in tertiary education, compared with only 16% of the SMK students. This clearly shows the potential bias in comparing SMA and SMK outcomes if a sample that contains only SMA and SMK graduates with high school education as their terminal educational level is used.

3. Employment and Earnings

Comparing estimates with and without data censoring correction for college entry

In this section, the effect of participation in vocational education on labour market outcomes in terms of levels of employment and labour earnings is estimated. The primary focus is the coefficient on the SMK dummy variable, holding constant the other

TABLE 1: Numbers by schooling in 1997 and activity in 2000.

1997			2000	
SMA	Female	301	Working	80
			Not working	120
			In college	101
	Male	283	Working	69
			Not working	100
			In college	114
SMK	Female	181	Working	69
			Not working	81
			In college	31
	Male	193	Working	83
			Not working	81
			In college	29
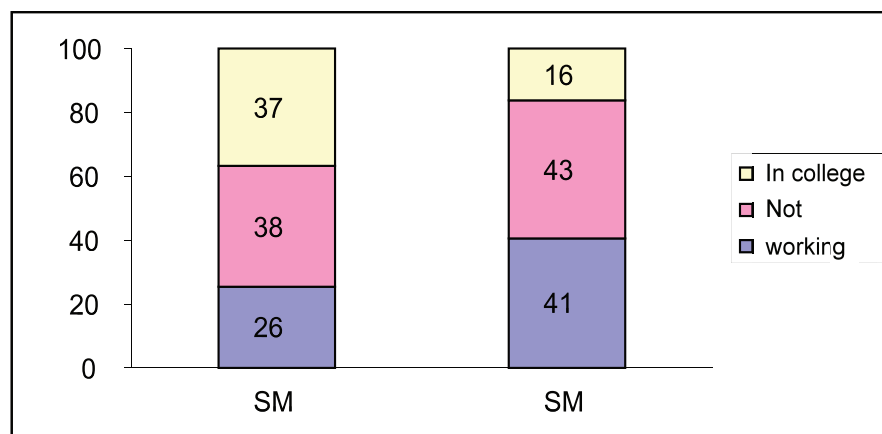
Figure 4: Distribution of activities in 2000 by 1997 high school students.

explanatory variables relating to various background and personal characteristics. A positive and significant coefficient on the SMK dummy variable would indicate that participants in the vocational track at the senior secondary level are on average more likely to find employment and achieve greater earnings than the SMA attendants.

The full set of variables used in the estimation is as follows:

In order to determine the probability of achieving employment after secondary school graduation, initially a methodology similar to that in a variety of existing literature is used, with a sub-sample with SMK or SMA as terminal education. Female and male samples are also distinguished for purposes of the estimation. The sample

TABLE 2: Sample summary statistics.

Variable Name	Definition		Mean Standard Error
Dependant variables:			
EMPLOYED	0–1 dummy variable, = 1 if individual was employed (2000)	0.314	0.464
COLLEGE	0–1 dummy variable, = 1 if individual was in college (2000)	0.287	0.453
EARNINGS	Individual's annual earnings in IDR/Indonesian Rupiah (2000)	2,073,100	2,281,100
EBTANAS2	Senior secondary school EBTANAS score	0.390	0.488
Explanatory variables:			
RURAL	0-1 dummy variable, =1 if household was in rural area (1997)	0.306	0.461
FEMALE	0–1 dummy variable, = 1 if individual is female	0.503	0.500
AGE	Individual's age (1997)	19.545	1.336
MARRIED	0–1 dummy variable, = 1 if individual was married (2000)	0.065	0.246
SMK	0–1 dummy variable, = 1 if individual was attending SMK (1997)	0.390	0.488
EDU_HH	Highest education level in years of schooling of household parents or household head (in absence of parents) (1997)	8.587	4.013
HH_INCOME	Household annual income in IDR/Indonesian Rupiah (1997)	5,491,500	6,365,000
EBTANAS1	Junior secondary school EBTANAS score	33.836	6.322
AGE 0 TO 5	Number of household member age 0–5 (1997)	0.337	0.622
AGE 6 TO 14	Number of household members age 6–14 (1997)	1.077	1.054
AGE ≥ 15	Number of household members age >=15 (1997)	5.089	2.042
P_SMK	Proportion of SMK schools among frequently mentioned high schools by households in village (2000)	0.353	0.347
P_PUBLIC	Proportion of public high schools among frequently mentioned high schools by households in village (2000)	0.469	0.372

generates results that conform to those found in the majority of the existing literature, demonstrating that SMK graduates are more likely to achieve employment after

graduation. Specifically, the sample demonstrates that attendance at SMK increases the probability of achieving employment by 7 percent. This effect seems to be most prominent for the sample of male students, with the sample of female students not demonstrating the same effect to a significant degree (Table 2).

TABLE 3: Profit estimates of *EMPLOYED* in 2000 (IFLS3, n = 683, 350 & 333), without censoring correction.

	Without censoring correction					
	All		Female		Male	
Independent variables	Profit Coefficient	Marginal Effect	Profit Coefficient	Marginal Effect	Profit Coefficient	Marginal Effect
RURAL	−0.014	−0.005	0.006	0.002	−0.038	−0.015
	-0.107	-0.042	-0.15	-0.058	-0.154	-0.061
FEMALE	0.062	0.024				
	-0.102	-0.04				
AGE	0.269***	0.106***	0.201***	0.079***	0.345***	0.136***
	-0.039	-0.015	-0.055	-0.021	-0.059	-0.023
				−		
		−0.318***	−1.116***	0.360***	0.04	0.016
	-0.198	-0.05	-0.232	-0.054	-0.476	-0.189
SMK	0.184*	0.072*	0.118	0.046	0.256*	0.101*
	-0.101	-0.04	-0.142	-0.056	-0.146	-0.057
MARRIED	-0.953***					
Intercept	−5.481***		−4.044***		−7.022***	
	-0.777		-1.059		-1.17	
R2	0.07	0.07	0.07	0.07	0.09	0.09

Standard errors in parentheses.

As mentioned earlier, this approach is prone to generate biased coefficient estimates due to the exclusion of those participating in tertiary education. The panel data allows us to correct this, as information regarding the schooling and employment status of the entire samplegroup can be obtained by observing the different high school tracks three years ago. A censored profit model is used to estimate the coefficient of the same variables. The empirical approach is the following:

y_1 ⊠ 1 if individual *i* is employed after secondary schooling, 0 if unemployed after secondary schooling

$y_2 = 1$ if individual i is in college, 0 otherwise.

For a given individual,

y_1 is not observed unless

y_2 equals 0. Thus, there are three types of

observations in the sample with probabilities:

$y_2 = 1$: $\Pr(y_2 = 1) = 1 - \Phi_2 (\Box_2 x_2)$

$y_1 = 1, y_2 = 0$:

$y_1 = 0, y_2 = 0$:

$\Pr(y_1 = 1, y_2 = 0) = \Phi(\Box_1 ' x_1, \Box \Box_2 ' x_2, \Box \Box)$ $\Pr(y_1 = 0, y_2 = 0) = \Phi(\Box\Box_1 ' x_1, \Box \Box_2 ' x_2, \Box)$

The likelihood estimates based on these probabilities are also presented in Table 4 in comparison with the uncorrected model. After controlling for sample selection due to college entry, the positive effect of SMK is no longer significant. This is also the case when female and male samples are separately used for estimations.

Turning to labour market earnings and using the sub-sample of SMK and SMA graduates who do not continue on to tertiary education, for those who were employed in 2000, SMK graduates' monthly earnings were on average 19 percent higher than those of SMA graduates.

When examining the female sample and male sample separately, it is found that the earnings premium for SMK graduates is only significant for the male sample. However, after using Heckman's 2-step procedure to correct the sample selection bias, this male SMK wage premium becomes insignificant (Table 5).

4. Instrumental Variable Estimates of Employment and Earnings

4.1. Using an instrumental variable to correct endogeneity bias

The previous section shows that after correcting data censoring and factoring in the impact of the higher levels of participation in tertiary education by SMA graduates, graduation from an SMK does not seem to improve the chance of obtaining employment or an earnings premium, as commonly believed. However, an important point that could cast doubt on this conclusion is that there may be systematic differences between the types of student who attend SMK and SMA, respectively. For example, if those who attend SMK are initially characterized by certain disadvantages that affect

TABLE 4: Profit estimates of EMPLOYED in 2000 (IFLS3, n = 859, 430 & 429), with censoring correction.

Independent Variable	With censoring correction					
	All		Female		Male	
	Profit Coefficient: EMPLOYED	Selection Coefficient: COLLEGE Entry	Profit Coefficient: EMPLOYED	Selection Coefficient: COLLEGE Entry	Profit Coefficient: EMPLOYED	Selection Coefficient: COLLEGE Entry
RURAL	−0.037	−0.217*	−0.002	−0.181	−0.112	−0.282
	-0.117	-0.119	-0.164	-0.161	-0.166	-0.179
FEMALE	0.157	−0.006				
	-0.106	-0.102				
AGE	0.264***	−0.028	0.225***	−0.047	0.297***	−0.014
	-0.046	-0.041	-0.064	-0.06	-0.069	-0.057
SMK	0.085	−0.405***	0.046	−0.307**	0.067	−0.542***
	-0.119	-0.111	-0.161	-0.153	-0.177	-0.166
MARRIED	−0.956***		−1.115***		−0.051	−0.282
	-0.208		-0.244		-0.484	-0.179
EDU_HH		0.091***		0.084***		0.094***
		-0.015		-0.022		-0.021
HH_INCOME		0.024***		0.014		0.034***
(million IDR)		-0.009		-0.013		-0.012
EBTANAS1		0.066***		0.065***		0.065***
		-0.009		-0.012		-0.013
Intercept	−5.213***	−3.101***	−4.316***	−2.643**	−5.772***	−3.398***
	-0.959	-0.932	-1.315	-1.332	-1.449	-1.312
Chi2	43.41	43.41	25.9	25.9	19.94	19.94
Rho:		0.363		0.235		0.591

their labour market outlook, then the fact that the rates of employment and average salaries are similar to those of SMA students may indicate that SMK can actually improve their opportunities when they enter labour market. In other words, the endogeneity of SMK choice can lead to bias in estimating the effect of attendance at SMK on labour market outcome. In the example here, it would result in underestimating the positive effect of attendance at SMK.

TABLE 5: Regression of EARNINGS (in IDR) in 2000 (IFLS3, n = 252, 515, 128, 258, 124 & 257), with and without censoring correction.

Independent Variable	All		Female		Male	
	OLS Coefficient Estimates	Heckman 2-step Estimates	OLS Coefficient Estimates	Heckman 2-step Estimates	Selection Equation Estimates	Heckman 2-step Estimates
RURAL	−549,218*	−558,768*	−614,066*	−635,735*	−479,310	−370,741
	-285,538	-321,134	-355,545	-376,951	-458,486	-555,599
FEMALE	144,960	143,284				
	(271,750)	(269,855)				
AGE	378,989***	375,070***	552,753***	541,741***	204,897	238,110
	-105,758	-121,991	-132,641	-149,049	-166,637	-191,663
SMK	576,895**	564,774*	371,828	353,463	772,357*	931,816
	-273,775	-333,286	-341,856	-356,563	-439,088	-643,329
EBTANAS1	52,526**	53,763*	77,296**	80,018**	20,809	8,156
	-25,214	-31,871	-29,836	-34,340	-42,734	-56,494
Intercept	− 7,320,112***	− 7,243,430***	−1.1e + 07***	−1.1e + 07***	−2,948,517	−3,576,034
	-2,431,150	-2,699,510	-2,998,174	-3,297,283	-3,862,292	-4,236,634
Mills ratio		−44,246		−121,374		399,596
		-710,669		-801,548		-1193612
Chi2		78.82		40.11		50.25
Rho:		−0.021		−0.065		0.174

This article uses an instrumental variable to correct the endogeneity bias. The instrumental variable used reflects the supply of SMK in the community. IFLS household surveys are accompanied by community facility surveys, which include a survey of information regarding schools in communities. In the survey, names of candidate schools were obtained from household responses, in which the household head verified the name and location of all schools currently attended by household members under age 25. These schools constituted the sampling frame and were listed in order of the frequency with which they were mentioned. The final sample consists of the most frequently mentioned facilities. The proportion of SMK schools in all frequently mentioned high schools in the community is used as the instrumental variable.

The coefficient estimates of a binary choice model for SMK and SMA are reported in Table 6. The effect of the instrumental variable, the proportion of SMK schools among all frequently mentioned high schools, is highly significant in determining SMK/SMA choice.

Using the predicted value of SMK probability and with controls for college entry censoring, similar result can be seen that attendance at SMK does not improve the probability of finding employment or earnings (Table 7).

5. College Entry and Ebtanas Score

5.1. Does attendance at SMK affect levels of participation in tertiary education, and how?

In Table 4 the results of college entry profit were presented. To correct for data censoring, two excluded variables that best predict the likelihood of participation in tertiary education are the level of parent's educational attainment (or, in the absence of parents in the household, the household head's level of educational attainment) and the total EBTANAS (National examinations administered at the end of junior and senior secondary cycles.) score achieved at the conclusion of junior secondary education. Household income also has a significant effect in predicting the likelihood of participation in tertiary education of boys, but not of girls.

Some of the results of college entry profit estimate may have potentially important policy implications. One finding is that, controlled for the aforementioned variables, together with the other factors related to household and personal background, attendance at SMK appears to have a significant negative effect on the level of participation in tertiary education.

However, before reaching such conclusions, it is necessary to answer two questions. First, it must be determined whether some unobserved characteristics affect both the choice of attendance at SMK or SMA choice and the level of participation in tertiary education simultaneously. For example, there might be varying innate abilities in terms of obtaining vocational skills compared to academic attainment. These differentiated abilities can only be known to the individual or households. In this case, the estimates of the effect of SMK on participation in tertiary education could be biased. In other words, the results may simply demonstrate that there is a *correlation* between the choice between the varying types of high school and the level of participation in tertiary education, but not a *causal effect*.

TABLE 6: Profit estimates of SMK choice in 1997 (IFLS2, n = 823, 418 & 405).

| | SMK | | | | | |
| | All | | Female | | Male | |
Independent Variables	Profit Coefficient	Marginal Effect	Profit Coefficient	Marginal Effect	Profit Coefficient	Marginal Effect
RURAL	−0.403***	−0.149***	−0.331**	−0.122**	−0.562***	−0.204***
	-0.107	-0.038	-0.147	-0.052	-0.162	-0.055
FEMALE	−0.042	−0.016				
	-0.093	-0.036				
AGE	0.01	0.004	0.017	0.006	0.018	0.007
	-0.036	-0.014	-0.052	-0.02	-0.052	-0.02
EDU_HH	−0.062***	−0.024***	−0.023	−0.009	−0.105***	−0.040***
	-0.013	-0.005	-0.019	-0.007	-0.019	-0.007
HH INCOME	−0.030***	−0.013***	−0.041***	−0.016***	−0.023	−0.009
(Million IDR)	-0.01	-0.004	-0.015	-0.006	-0.014	-0.005
EBTANAS1	−0.035***	−0.013***	−0.029**	−0.011**	−0.040***	−0.015***
	-0.008	-0.003	-0.011	-0.004	-0.012	-0.005
AGE 0 to 5	−0.004	−0.001	−0.016	−0.006	0.025	0.009
	-0.078	-0.03	-0.114	-0.043	-0.109	-0.042
AGE 6 to 14	−0.032	−0.012	0.013	0.005	−0.097	−0.037
	-0.046	-0.017	-0.062	-0.024	-0.069	-0.026
AGE ≥ 15	0.005	0.002	0.012	0.004	−0.023	−0.009
	-0.024	-0.009	-0.031	-0.012	-0.038	-0.015
P_SMK	0.764***	0.291***	0.926***	0.350***	0.645***	0.247***
	-0.138	-0.052	-0.197	-0.074	-0.197	-0.075
P_PUBLIC	−0.083	−0.032	0.135	0.051	−0.327*	−0.125*
	-0.129	-0.049	-0.184	-0.07	-0.187	-0.071
Intercept	1.274		0.387		2.023*	
	-0.831		-1.188		-1.183	
R2	0.116	0.116	0.094	0.094	0.168	0.168

To explore the net effect of attendance at SMK on levels of participation in tertiary education, the SMK's effect on the learning process is examined. One unique area of information that IFLS has is the national examination results of individuals. T-test

TABLE 7: IV estimates of EMPLOYED and EARNINGS (IFLS3, n = 823 & 493).

	IV estimates	
Independent Variable	Profit Estimates of EMPLOYED	Heckman 2-step estimates of EARNINGS using IV
RURAL	−0.403***	−548,234
	-0.107	-365,006
FEMALE	−0.042	171,557
	-0.093	-286,221
AGE	0.01	399,444***
EDU_HH HH INCOME	-0.036	-122,032
	−0.062*** (0.013)	
	-0.031***	
(million IDR) EBTANAS1	-0.01	
	−0.035***	62,790*
	-0.008	-32,543
AGE 0 TO 5	−0.004	
	-0.078	
AGE 6 TO 14	−0.032	
	-0.046	
AGE ≥ 15	0.005	
	-0.024	
P_SMK	0.764*** (0.138)	
P_PUBLIC	−0.083	
	-0.129	
Predicted SMK		962,842
		-1,083,657
Intercept	1.274	−8,345,745***
	-0.831	-3063216
Chi2	128.05	61.16
Rho:		0.105

results show that SMK entrants have significantly lower final junior secondary school examination

results. However, in three years, the variations in the degree of attainment between the two types of senior secondary grew even more significant. Controlled for junior secondary school examination score, it is found that attendance at SMK adds much less value in terms of educational attainment as measured by examination results at the end of senior secondary education (Figure 5).
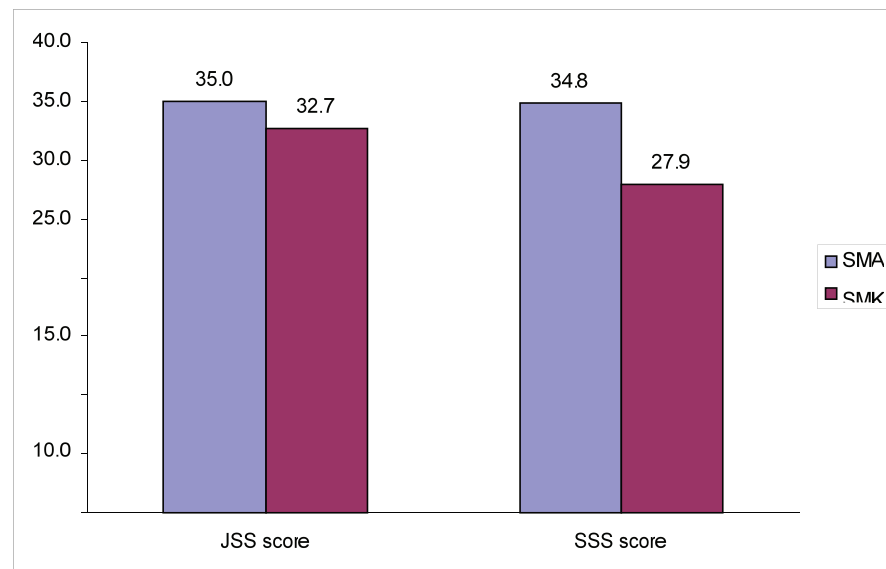
Figure 5: EBTANAS score by SMA/SMK. Source: IFLS II and III.

A further examination of the determinants affecting EBTANAS score at the end of senior secondary level demonstrates similar results: controlled for EBTANAS score at junior secondary level and other key background variables, attendance at SMK is associated with significantly less added value in terms of test scores. The empirical question is: Is this because unobservable variables determining the choice to attend SMK also determine their time and effort in learning academic content? Or is it because SMK's specific characteristics, such as curriculum and overall teaching and learning practices, do not encourage the achievement of higher academic attainment? An instrumental variable is also used here to distinguish these two channels of effect. Using predicted value of SMK probability, the estimation still demonstrates a significant negative effect of attendance at SMK on

EBTANAS score. This strongly suggests that it is indeed attendance at SMK per se that adds less value to academic achievement (Table 8).

We now turn to an examination of the relationship between SMK attendance and levels of participation in tertiary education. There are two hypotheses on how SMK attendance can affect the odds of participation in tertiary education: one is that SMK

TABLE 8: IV estimates of senior EBTANAS score/EBTANAS2 and COLLEGE entry: (IFLS3, n = 708, 681, 823 & 823).

EBTANAS2 Independent Variable		COLLEGE		
	OLS Estimates	IV Estimates	IV Estimates	IV Omitting EBTANAS Score
EBTANAS1	0.709***	0.614***		
	-0.042	-0.053		
RURAL	−0.785	−1.695**	−0.033	−0.145***
	-0.567	-0.697	-0.042	-0.034
FEMALE	0.054	−0.375	0.008	−0.010
	-0.49	-0.516	-0.032	-0.032
AGE	0.488**	0.465**	−0.017	−0.014
	-0.196	-0.204	-0.013	-0.012
EDU_HH	0.230***	0.066	0.024***	0.024***
	-0.069	-0.094	-0.006	-0.006
HH INCOME	0.065	0.004	0.006**	0.002
(million IDR)	-0.043	-0.05	-0.003	-0.003
SMK	−4.468***			
	-0.531			
PRED_SMK		−11.096***	0.226	−0.490***
		-2.553	-0.164	-0.131
PRED_EBTANAS2			0.032***	
			-0.005	
Intercept	-2.249	6.378		
	-4.355	-5.239		

attendance is stigmatized, as it is usually children from households of the lower socioe-conomic strata that attend SMK. The other hypothesis is that SMK may not provide a conducive learning environment for students to pursue higher levels of education through lesser value-added in academic achievement, as shown in EBTANAS score at graduation.

To test these two hypotheses, the predicted value of SMK choice is used to estimate its effect on college entry. The result shows that attendance at SMK does not affect college entry when controlled for other variables, including test scores. However, if the score variable is omitted, attendance at SMK is demonstrated to have a significant

and negative effect on levels of participation in tertiary education. It can be concluded that only by reducing levels of academic achievement as measured by test score that attendance at SMK reduces the chance of being able to participate in tertiary education; but that attendance at SMK per se does not create a disadvantage or stigma in terms of lowering the likelihood of participating in tertiary education.

6. Conclusions

This article has compared vocational secondary schools with academic schools in terms of their effects on the ability and likelihood of attaining employment; labor market earnings; and participation in tertiary education in the Indonesian context. Using a panel of two waves of 'Indonesia Family Life Survey' (IFLS II and IFLS III) in 1997 and 2000, a cohort of high school students in 1997 is tracked to determine their schooling and employment status in 2000. It is found that

1. Attendance at vocational secondary schools results in *neither market advantage nor disadvantage* in terms of employment opportunities and/or earnings premium;

2. Attendance at vocational schools leads to *significantly lower academic achievement* as measured by national test score;

3. There is *no stigma attached to attendance at vocational schools that results in a disadvantage in access to tertiary education*; Rather, it is the lower academic achievement associated with attendance at vocational school that lowers the likelihood of entering college.

These results are based on empirical approaches that take into account the observation censoring problem due to the impact of varying degrees of participation in tertiary education, with corrections for endogeneity problems related to household choice to attend either vocational or general academic schools, using instrumental variable.

It is hoped that the findings of this article can provide input to the current debate in Indonesia on whether public funds allocated for secondary education should be invested in the expansion and improvement of general academic or vocational schools. The empirical results presented in this article do not support the main argument for the expansion of vocational education at secondary level, which is that it leads to better labor market outcomes. Furthermore, the demand for vocational schools is associated with lower household incomes and lower parental levels of educational attainment.

Therefore, it is likely that as the economy grows and income levels improve, the demand for general academic schools and higher education will increase correspondingly.

A more important implication of the results presented here is that the vocational schools as they currently operate do not add much value to cognitive skills as measured by test scores. Recent research has shown a strong causal relationship between levels of cognitive skills and levels of economic growth. This indicates that a majority of Indonesia's vocational schools serve mainly as 'second chance' opportunities. In the context of the global economy today, one policy option may be to revamp the SMK or build a segment of SMK into stronger institutions as an alternative route to tertiary level learning in order to achieve higher level skills development. However, a prerequisite for this would be to strengthen the value-added that vocational schools offer in terms of cognitive skills.

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