

# **Analysis of Upper Secondary School Dropout in Central Java Province, Indonesia: Preliminary Results and Insights**

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## **ABSTRACT**

Indonesia's education system has gradually improved and enrolment rates have increased greatly over the last 40 years. However, the country still faces a dropout problem, especially at upper secondary school level. The aim of this research is to examine the effects of potential determinants on the likelihood of an individual to complete or drop out of upper secondary school in Central Java Province. Unlike most previous studies, we have collected primary data enabling more in-depth and systematic analysis of the issue. 439 former upper secondary schools' students and 878 parents/guardians participated in the research. To analyse the data, we employ Logit, OLS and Probit regressions. Preliminary results indicate that being female increases the probability of dropout. Other findings include: A significantly lower level of dropout when household heads have a university degree, when students' academic activities are supported by mothers (but not by fathers), and when poor students receive government cash transfers. Having more family members increases the probability to drop out, suggesting that the traditional Javanese preference for large families might play a role. We also explore interaction effects between variables in order to provide further insights into the dropout problem. Last but not least, based on our findings, existing policies are discussed and new policies are proposed to reduce the number of dropouts.

## **1. INTRODUCTION**

Education has become the main policy to foster growth in both developed and emerging countries (Dearden, Emmerson, Frayne & Meghir, 2009). However, there are some barriers for a student to get a better education, such as dropping out of school before graduating. School dropout is considered a global problem (Ajaja, 2012; Alivernini & Lucidi, 2011; Dekkers & Classen, 2001; Dunn, Chambers & Rabren, 2004; Lundstræ, 2011; Sang, Koros & Bosire, 2013; Suh & Suh, 2011; Taş, Bora, Selvitopu & Demirkaya, 2013; and Townsend, Flisher, Chikobvu, Lombard & King, 2008). A current widespread and deep concern has been the number of students who never graduate from high school. A great number of studies on dropout have been conducted in many countries to explain factors contributing to dropping out of school. However, there is still little information about the causal factors that lead to the dropout decision (Tyler & Lofstrom, 2009). Dropping out of school is not just simply due to poor grades or bad behavior, but it is a complex problem. Dropout must be considered as a process of events rather than only a single event, which interacts with social contexts and environmental situations (Hunt, 2008).

This study focusses on the dropout problem in Indonesia. After recovering from the deep economic crisis in 1998, the country has seen tremendous improvements through major political, economic and social changes. Nowadays Indonesia is regarded as a success story in Asia and the Pacific. World Bank classifies Indonesia as a lower middle-income country (World Bank, 2015) with gross national income per capita gradually increasing from \$1,011.5 in 2000 to \$1,682.5 in 2012 (in constant 2005 price). Not everyone has been able to gain from Indonesia's great achievement. UNICEF (2012) states that poverty is still a major problem for the country. Half of Indonesians do not earn more than US\$1.75 a day to live on. One of the major impacts of poverty is on education. According to an official report, almost 50% of children aged 7–17 in 2011 did not attend school or left school because of financial problems (Ministry of Women Empowerment and Child Protection & Indonesian Central Statistics Agency, 2012). However, the report has some shortcomings: First, it is clearly an aggregate report for all school levels. Second, the respondents of the survey also include those who did not attend school. Third, the official upper secondary school age of students in Indonesia is 16 – 18 year olds, while the report limits respondents to up to 17 year olds only. Thus, it is not clear from the report whether students at upper secondary school left school mainly because of financial problems or not. Therefore further research to investigate the reasons for school dropout is needed.

The research reported in this paper provides systematic and in-depth research focusing specifically on upper secondary school dropout in Indonesia. It improves on previous studies in several ways. It covers a bigger set of explanatory variables and uses a more precise definition of dropout. It also employs an innovative approach in questionnaire design and a better probability sampling technique for primary data collection on student dropout.

The principal findings of the research so far are as follows. Females have a higher probability to drop out than males. The main reasons may be schools' strict regulations about pregnancy and early marriage. We also identify that a family's low socioeconomic status, as a proxy for poverty, is associated with a higher probability to drop out, and that household heads with university degree education reduce the likelihood to drop out. Furthermore, Government's poor students' scholarship has successfully reduced the probability to drop out. Interaction effects are also explored. It is found that girls residing in rural areas and girls who have divorced parents have higher probability to drop out than boys.

The paper is organised as follows. Section 2 briefly reviews previous studies on school dropout at all school levels. Section 3 presents the data and methodology. The main results are discussed in Section 4. Section 5 discusses the robustness of the results. Section 6 explores the potential policy implications and section 7 contains concluding comments.

## **2. LITERATURE REVIEW**

In some countries, poverty is no longer the main reason for upper secondary school dropout. A recent survey in Latin America shows that students in Chile, Costa Rica and El Salvador express lack of interest in education as a main reason to drop out (Inter-America Development Bank [IADB], 2014). A 2006 national survey in the US also reports that almost half (47%) of students drop out because they are uninterested in classes and feel disconnected from high school (Bridgeland, Dilulio Jr. & Morrison, 2006). However, a 2012 survey in the US presents information that lack of parental and educational support is the main reason American students drop out of high school (Globe Newswire, 2012). IADB's survey also shows that in some countries in Latin America (such as Honduras, Panama and Paraguay), poverty is still a main reason to drop out. In Indonesia, government agencies inform that having financial problems is the major cause of dropout (Ministry of Women Empowerment and Child Protection & Indonesian Central Statistics Agency, 2012). Not surprisingly, students report a variety of reasons for dropping out of school and they are different from country to country.

One of the problems encountered in the studies of dropouts is lack of a uniform definition. There is no consensus about how to define a school dropout. Most previous studies just directly construct a variable without giving a clear definition of dropout. Others use a simplified definition. For example, South, Haynie and Bose (2007, p. 74) classify adolescents as school dropouts if "they reported being expelled or having dropped out of school as the reason they were no longer enrolled". No and Hirakawa (2012, p. 30) define dropouts as "those who were absent on the two days of the field work and 95% of their classmates testified that they had not come to school for more than one month were regarded as dropouts as well". Both studies ignore the possibility of students to enrol in other schools and simply count students who are "being expelled" and "had not come to school for more than one month" as dropout students.

In the case of Indonesia, previous studies on dropout (for example Sparrow, 2007; Cameron, 2009; Toi, 2010; and Ha & Mendoza, 2010) have not presented a clear definition of dropout. Also, the definition used by the Indonesian Central Statistical Agency (BPS) is ambiguous and simplistic. For example, the BPS does not differentiate students' mortality factor in the calculation of dropout rates. If the mortality factors are included in the dropout rate calculation, the dropout rate seems larger than is the case.

As stated by Hunt (2008), most previous studies view dropout as an event rather than a process. However, the decision to drop out of school is often influenced by a series of correlated problems. To address this issue, some studies apply longitudinal data to capture the dropout process (for example, Alivernini & Lucidi, 2011; Fall & Roberts, 2012; No & Hirakawa, 2012; and South et al.,

2007). Although longitudinal data are useful, unfortunately this type of study also has its weaknesses. As explained by Schroder and Borch-Supan (2008), the inconsistencies of answers from respondents in longitudinal data may negatively influence the quality of the research. No and Hirakawa (2012) confirm this problem. During their second wave of collecting data, they randomly selected some students from the first wave and asked them to answer the same questions as in earlier field work. They found some answers changed compared to the previous answers.

One of the weaknesses of using secondary data is the fact that researchers do not meet the respondents and collect data from them directly. It is difficult to assess data from a third party in order to clarify whether the dropout student is permanently or just temporarily leaving school. The assumption that people who have dropped out will never complete school and people who have not graduated must be dropouts is wrong. Some previous studies (for example, Chatterji & DeSimone, 2002; Roebuck, French & Dennis, 2004; and South et al., 2007) only determine the status of students who drop out of school based on a particular point in time. In the US, a person who drops out of school can eventually complete high school, either by completing the requirement for a diploma or by examination (Rumberger, 2001). Therefore, a person's status in the US can change over time. A researcher must be aware of this when defining dropout status in countries where there are possibilities for dropouts to get a certificate which is equivalent to a high school diploma. In Indonesia, there is a program for dropout students to get an upper secondary school diploma by completing the examination named Package-C<sup>1</sup>.

Some studies use students who are still enrolled in school in comparison to those who dropped out (for example, South et al., 2007, at high school level and Hanushek, Lavy & Hitomi, 2008, at primary school level). In our opinion, using currently enrolled students is incorrect because there is no guarantee they will definitely complete or graduate from school. If enrolled respondents leave school before they graduate, the results will be biased. Therefore, it is better to use graduated students, instead of still enrolled students, in comparisons with dropout students.

Rumberger and Lim (2008) review the past 25 years of research on dropouts and propose two types of factors that predict whether students drop out or graduate from high school: (1) Factors associated with *individual characteristic*, such as students' attitudes, behaviors, school performance; (2) factors associated with *institutional characteristics*, that is characteristics of their families, schools, and communities.

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<sup>1</sup> The Package-C program is a non-formal equivalent to an upper secondary education program which would provide both general and vocational education to junior secondary school graduates and to upper secondary school dropouts.

Rumberger and Lim (2008) believe that students' demographic background plays an important role in dropout. With respect to gender, for example, in western countries boys are significantly more likely to drop out than girls (see Bergeron et al, 2011, for Canada; Blanchard & Sinthon, 2011, for France; South et al., 2007, and Suh & Suh, 2011, both for the US; Mo et al., 2013, for China). Conversely, there are a higher percentage of dropouts among girl students in Nigeria (Ajaja, 2012) and Bangladesh (Shahidul, 2012). In China, Diyu (2001) finds that parents deliberately push their daughters to leave school because they think that sending girls to school wastes time and money. In under-developed countries the opportunity cost of sending girls to school is higher than that for boys (Diyu, 2001; Thanh & Long, 2005; No & Hirakawa, 2012). Based on previous studies, it seems that, in developed countries, male students tend to drop out more than female students, while in developing countries, female students are more likely to drop out than male students.

Previous research has identified several types of family resources and how they impact on student development (Rumberger & Lim, 2008). The most used indicator of family resources is financial resources. Students in families with lower incomes are more likely to drop out (Blanchard & Sinthon, 2011; Diyu, 2001; Roebuck et al., 2004; Shahidul, 2012), while other studies indicate that a higher level of a family's socioeconomic status tends to be associated with staying at school (Amadi, Role & Makewa, 2013, for Kenya; Makwina-Morara, 2009, for Botswana; Mo et al., 2013, for China; Traag & van der Velden, 2011, for the Netherlands). Research in the US finds that students from high socioeconomic status (SES) are almost 50 per cent less likely to dropout than students from average SES families (Rumberger & Thomas, 2000). Human resources of parents, as reflected in their education, play an important role to improve cognitive development of their children. Some studies show that the probability to drop out decreases as parental levels of education rise (Blanchard & Sinthon, 2011; Shahidul, 2012; South et al., 2007; Terry, 2008; Tomas, Solis & Torres, 2012). More specific to China, father's education, but not mother's education, is found to be significantly correlated with lower dropout (Yi et al., 2012).

Rumberger and Lim (2008) also conclude that structural characteristics of schools contribute to students' performance. School location contributes to student dropout, for example in rural areas (see Ajaja, 2012, for Nigeria; Blanchard & Sinthon, 2011, for France; Suh & Suh, 2011, for the US). There is a variable that seems to be tested only in developing countries, namely distance to school (Mason & Rozelle, 1998; Mike, Nakajjo & Isoke, 2008; and Sabates, Hossain & Lewin, 2010). The particular type of school can also contribute to student dropout, for example General high School versus Vocational High School (see Blanchard & Sinthon, 2011, for France), private school versus public school (see Rumberger & Thomas, 2000, for the US), male versus female single sex school and mixed versus single school (see Ajaja, 2012, for Nigeria).

Only a few previous studies examine the causes of dropout at senior secondary school level in Indonesia. Most of them examine the effect of the Social Safety Net Scholarship to prevent students from dropping out (Cameron, 2009; Ha & Mendoza, 2010; and Sparrow, 2007). This scholarship was part of Indonesia's Social Safety Net Program in response to the Asian financial crisis in 1998. Sparrow (2007) analyses the effect of the scholarship program to help students during the crisis and one of his empirical results shows that 13% of scholarship holders would have dropped out if they had not got the grant. For primary school, the effect is 10%. He also estimates that the effect for junior secondary school is 12%. However, Sparrow concludes that there is no effect of scholarships on student dropout at the upper secondary school level. Cameron (2009) uses a linear probability model and concludes that scholarship grants effectively decreased the probability of dropout only for junior secondary school but had no impact at all in primary school. Moreover, Cameron fails to find an effect of scholarships on student dropout at the upper secondary school level because the samples are too small to create fixed effects. Sparrow (2007) explains that the insignificant impact of scholarships may occur because the scholarships have been allocated to poor students in primary and junior secondary school only. Primary school students from the two poorest quintiles received 70.7% of the scholarships, while 3.2% was received by the richest quintile. Also 56.8% of the scholarship allocations to junior secondary schools were received by the two poorest quintiles, while 6.9% went to the richest quintile. In contrast, distribution of the scholarship at upper secondary school was totally not pro-poor, because it was distributed quite evenly among household per capita expenditure quintiles.

A more recent study of the impact of the crisis is Ha and Mendoza (2010). Although they also examine the impact of scholarships on primary and junior secondary school dropout, this study uses aggregate level data, as does Sparrow (2007), while Cameron (2009) uses individual level data. By using the Probit regression, they suggest that Indonesia's Social Safety Net Program contributed to keeping students in class for primary school but not junior secondary school. This finding is contradicted by Cameron (2009). However, Ha and Mendoza (2010) argue that Cameron's study was conducted in the first few months of the scholarship's activity and it was impossible to determine the accurate impact by observing those few months. They also point out that the data used by Cameron (2009) are not representative of the national population.

Other research on dropouts is conducted by Toi (2010). She uses covariance structure analysis to pinpoint the determinants of educational environment factors (such as principals' and teachers' qualifications, school budget, and learning circumstances) on educational outcomes (exit examination and dropout rate) at lower secondary school level before and after the decentralization era in Indonesia in 2001. Decentralization in education was implemented by the Ministry of National

Education passing educational administrative authority for primary and junior secondary schooling to local government in regencies and cities, and transferring the authority for upper secondary schooling to local government at the provincial level. She finds that before the decentralization era, the increase in school expenditure enhanced the quality of the educational environment and caused a lower dropout rate. In contrast, after the decentralization era had commenced, the relationship between variables became less significant. However, her research does not suggest how to decrease student dropout. She mentions that it is subject to future investigation (*ibid*: p. 119).

In the context of Indonesia, since 2010 education has become one of 11 national priorities and the government has set universal education attainment to the upper secondary school level. The Ministry of Education and Culture launched a 12-year compulsory education program on June 2013 named Universal Secondary Education (in Indonesian: *Pendidikan Menengah Universal*, or PMU). The previous basic education program commenced in 1994 and only covered every citizen aged 7-15 years for free and compulsory education, but now it is extended to 7-18 years olds to provide equal access to education for upper secondary school students. However, there is an issue with this policy not having the power to force students to regularly attend upper secondary school. There are no penalties or fines for any parent who fails to keep their children in upper secondary school. Although the government recognizes the importance of Universal Secondary Education in Indonesia, there are no strict regulations to cover the policy.

The growth of education development in Indonesia, particularly as shown in terms of primary and secondary enrolment rates, has gradually increased. For about 40 years, the percentage of children who are enrolled at school has been rising<sup>2</sup>. The net enrolment ratio<sup>3</sup> (NER) at primary school level has increased from 72% in 1975 to 91.5% in 1998, then 94.4% in 2009 and rose to 95.6% in 2013. Lower secondary NER rose from 17% in 1975 to 58.4% in 1998, then 67.4% in 2009 and increased to 73.9% in 2013. Upper secondary NER rose from 17% in 1975 to 36.9% in 1998, then 45.1% in 2009 and increased to 54.3% in 2013 (Indonesian Central Statistics Agency, 2014).

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<sup>2</sup> The school system in Indonesia consists of primary schools, lower secondary schools and upper secondary schools.

<sup>3</sup> Net enrolment ratio (NER) = Enrolled children in the official school age group / Total number of children in the official school age group.

Gross enrolment ratio (GER) = Enrolled children of all ages / Total number of children in the official school age group. Thus, if there is late enrolment, early enrolment, or repetition, the total enrolment can exceed the population of the age group that officially corresponds to the level of education – leading to rates greater than 100%.

In Indonesia, GER of the primary school has increased from 62% in 1973 to 109.3% in 1998, then 110% in 2009 and decreased to 107.7% in 2013. Lower secondary GER rose from 17% in 1973 to 70.3% in 1998, then 81.1% in 2009 and 86.0% in 2013. The last, upper secondary GER rose from 9% in 1973 to 46.4% in 1998, then 62% in 2009 and 66.6% in 2013 (Indonesian Central Statistics Agency, 2014). However, greater than 100% primary school's gross enrolment ratio in Indonesia indicates inefficiencies of Indonesia's educational system. NER is more useful since NER excludes late enrolment, early enrolment, or repetition.

Although the data show that school enrolments have increased, Indonesia still faces a high dropout rate. Compared with other school levels, Table 1 shows that dropout rates in upper secondary school in Indonesia are higher than in primary school and in lower secondary school. This problem has become an educational challenge for the Government of Indonesia (GOI) to reduce the large number of dropouts which occur at the upper secondary school level.

**Table 1. Trends in Dropout Rates in Indonesia by Level and Type of School**

Level and Type of School	Academic Year									
	2005/2006		2006/2007		2007/2008		2008/2009		2009/2010	
	No.	%	No.	%	No.	%	No.	%	No.	%
Primary School (PS)	824,684	3.17	625,055	2.41	475,145	1.81	437,608	1.64	445,075	1.65
Lower Secondary School (LSS)	148,890	1.97	232,828	2.88	332,824	3.94	214,775	2.49	209,263	2.33
Upper Secondary School (USS)	171,485	3.14	190,822	3.33	160,618	2.68	235,744	3.63	296,901	4.27
- General USS	61,652	1.81	97,663	2.79	127,720	3.56	141,712	3.77	126,069	3.27
- Vocational USS	109,833	5.08	93,159	4.17	32,898	1.37	94,032	3.43	170,832	5.52

Source: Ministry of National Education, Republic of Indonesia (2010)

Awareness of the significance of education needs to be increased in society. If the dropout trend is not terminated, or at least reduced, the future of these high school dropouts is likely to be grave (Ingram, 2005). Therefore, Ingram (*ibid*) emphasizes the importance of research on high school dropouts and the outcome of the research is expected to prevent the students most vulnerable to dropout and help them to stay and finish high school. As a result, this could improve their economic achievement in the future.

Analysing the determinants of upper secondary school dropout in Indonesia is vital because the benefits of the outcome can help government agencies, universities, school practitioners and other interested parties to develop effective policies and responsive strategies to prevent students from dropping out of school. Furthermore, the correct strategies and policies in the long run will help nations, especially Indonesia, to eradicate poverty, improve people's welfare and, in addition, will increase the nation's growth and development.

### **3. DATA AND METHODOLOGY**

#### **A. Survey**

The primary data collection was conducted in Central Java Province, which is located in the central part of Java Island, the main island in Indonesia<sup>4</sup>. Central Java Province area is 32,548 km<sup>2</sup> or approximately 25% of the area of the island of Java. Administratively, Central Java Province consists of 29 regencies and six cities. Samples were collected from all regencies and cities.

In this research, an upper secondary school dropout is defined as an individual who: (1) was officially enrolled in an upper secondary school at grade 10 but left school permanently before completing upper secondary school, (2) is not observed to be enrolled in other formal education, (3) does not hold a package-C certificate, and (4) does not have a temporary absence from school due to suspension or illness.

The intended participants for the questionnaires are ex-students who were initially enrolled in grade 10 in the 2010/2011 academic year in Central Java Province and their parents or guardians<sup>5</sup>. During July – September 2014, two types of questionnaires were distributed, one to ex-students (who either graduated or dropped out) and another to their parents/guardians, in 29 regencies and 6 cities throughout Central Java Province. Initially, 514 former upper secondary schools' students from 115 schools and 977 parents/guardians agreed to participate in the research. However, for this paper, only ex-students with both parents that also answered the questionnaires are used for the regression analysis (439 ex-students and 878 parents/guardians).

In the survey we asked the dropout students why they left school. Table 2 reports the reasons they gave for dropping out. There are 113 dropout students out of a sample of 514 participating ex-students. 59 dropout students (52.2%) were male and the remaining 54 dropout students (47.8%) were female. Financial problem is still the main reason for leaving school. Pregnancy and marriage also contribute to the high number of dropouts in Central Java Province. Almost all schools that we visited, except one school, have a strict regulation that students are not allowed to get married and pregnant while they attend school.

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<sup>4</sup> Java Island's area only covers 6.8% of the total area of Indonesia, but the concentration of economic activities in the country has been predominantly located on this island. Six provinces in Java Island contribute 58.95% to Indonesia's gross domestic product (GDP) in 2000 and only dropped slightly to 57.5% in 2012. This high contribution was mainly driven by industrial sectors (Kuncoro, 2013). Moreover, Java Island is the most populous island, with 57.5 % of the Indonesia population residing in Java Island in 2010, and it is said the 'heartland' of Indonesia's economic activities (Kuncoro, ibid).

<sup>5</sup> Every student at upper secondary school level in Indonesia must follow 3 years of education (from grade 10 to grade 12). At grade 12 there is a final examination to determine whether a student is eligible to finish their education or not. In general, upper secondary school's National Final Examination is held in May every year and the results are announced in June. So, the students of grade 10 of the 2010/2011 academic year will have finished their education by June 2013. During a students' 3 years of education, it is possible to drop out of school at grade 10, grade 11 or grade 12. Therefore, by June 2013, students in grade 10 of 2010/2011 academic year are classified into three types: (1) those who graduated, (2) those who repeated a grade (but graduated in 2014) and (3) those who dropped out of school.

**Table 2. Reasons for Dropping Out Reported by All Dropouts**

Reasons of Dropping Out	All Dropouts	Female	Male
Financial Problems	25.5%	24.6%	26.4%
Pregnancy	13.9%	29.2%	-
Bored	13.9%	9.2%	18.1%
Marriage	13.1%	18.5%	8.3%
Problems with teacher(s)	5.8%	1.5%	9.7%
Expelled	5.8%	3.1%	8.3%
Got a job	4.4%	3.1%	6.9%
Running/Helping family's business	2.9%	3.1%	4.2%
Failing classes	2.2%	-	4.2%
Illness	1.5%	1.5%	2.8%
Problem with Peer(s)	1.5%	3.1%	2.8%
Others	9.5%	3.1%	8.3%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
No. of respondents	113	54	59

We also divide the reasons given for dropout based on gender. Table 2 indicates that pregnancy is the main reason for female students to drop out, followed by financial problems and marriage. Financial problems are the main reason for most male dropouts, followed by being bored with school and problems with teachers. The percentage of male students who dropped out of school because of being bored is twice as high as that of female students (18.1% to 9.2%). Seven male dropouts, but only one female dropout, stated that they left school because they had problems with teachers. This could be a strong indication that male students more frequently have problems with teachers than do female students.

## B. Model and Method

The goal is to examine the effects of individual characteristics, family characteristics, school characteristics and Indonesian government policy & macroeconomic conditions variables on the likelihood of an individual to complete or drop out of an upper secondary school education in Central Java Province, Indonesia.

First, the model specification for the dropout decision in general form is adapted from Roebuck et al. (2004), as follows:

$$D_i = f(I, F, S, GM)$$

Where  $D$  is a dichotomous measure of whether an individual  $i$  has completed upper secondary school or has permanently dropped out of an upper secondary school education,  $I$  is a vector of individual characteristics variables,  $F$  represents a vector of family characteristics variables,  $S$  denotes a vector of school characteristics variables and  $GM$  is a vector of government policy and macroeconomic conditions variables.

The model specification above is derived from the conceptual model of high school performance proposed by Rumberger and Lim (2008). As mentioned earlier, they propose two types of factors that predict whether students drop out or graduate from high school. They are: Factors associated with *individual characteristic* and factors associated with *institutional characteristics*, that is characteristics of their families, schools, and communities. However, two aspects are missing in their conceptual model. First, they did not include government policies as a factor to prevent student dropout. Some previous studies have examined how the impact of certain policies reduces student dropout. For example, it is found that an increase in government expenditure on education will reduce the dropout rate (Chaudhuri & Maitra, 2008), while Heckman, Humphries, LaFontaine, and Rodriguez (2008) evaluate the effect of General Education Development (GED) test policy innovations on high school graduation rates in the US. GED certification is equivalent to traditional high school diploma. They conclude that GED program encourages students to drop out of school because students simply take the GED test instead of attending school. Dearden et al. (2009), based on their study in England, suggest that a conditional cash transfer (CCT) to high school students is an effective way to reduce dropout. Second, beside policies, macroeconomic conditions also influence students to drop out. A study for Canada suggests that the decision to drop out is affected by high minimum wages and lower unemployment rate (Montmarquette, Viennot-Briot, & Dagenais, 2007). Therefore, this study includes government policy and macroeconomic conditions in the analysis.

The next step is to turn the general model into an empirical model:

$$D_i = \beta_0 + \beta_1 I + \beta_2 F + \beta_3 S + \beta_4 GM + e_i$$

Where:

$\beta_1 ; \beta_2 ; \beta_3$  and  $\beta_4$  = Vectors of parameters to be estimated

$e_i$  = Error term

$D_i$  = 1 if individual  $i$  is a dropout, and 0 otherwise.

The vector of individual characteristics ( $I$ ) contains 10 explanatory variables, they are: gender, age at first entry, working experience, perception of education, grade repetition, students' home location, previous academic performance, changing school experience, deviant behaviour and health. The vector of family characteristics ( $F$ ) consists of 13 explanatory variables, as follow: family's socioeconomic status, household head education level, father's academic supports, mother's academic supports, family size, sibling rank, sibling's dropout experience, parents are divorced, non-working mother, time helping family with household chores, time helping family with daily business/work, father's participation in household decision-making and mother's participation in household decision-making.

The vector S contains 8 explanatory variables, those are: school location, relation with teacher, bullied by peers and/or teachers, school curriculum (general upper secondary school versus vocational upper secondary school versus Islamic upper secondary school), school type (public versus private upper secondary school), distance to school, students' schooling expenditure, and teacher quality. The vector GM consists of four explanatory variables. They are the Government's cash transfer to poor students, real minimum wages, unemployment rate and spatial dummy.

There are three important variables widely used in dropout prevention in The US. They are known as the ABC's of disengagement: attendance (i.e., number of absences), behaviour and course performance (or academic achievement) (Hoff, Olson, & Peterson, 2015). The US National High School Center only focuses on two variables, attendance and course performance, because these two variables are considered to be the most powerful predictors of dropout (Heppen & Therriault, 2008). However, attendance and course performance are not included in our analysis. Our pilot project indicates that respondents cannot remember exactly how many times they were absent from class during their study. As the proxy of academic performance, we only use lower secondary school final examination grade. We were not able to gather official academic reports from respondents.

Rumberger & Lim (2008) conclude that Logit and Probit regressions have been employed widely for high school dropout research. Studies using Logit regressions include, for example, Shahidul (2012); Tomas et al. (2012); Blanchard and Sinthon (2011); Suh and Suh (2011); McCaffrey, Pacula, Han and Ellickson (2008); Townsend et al. (2008) and South et al. (2007). Those using Probit regression include, for example, Dearden, et al. (2009); Hanushek et al. (2008); Suryadarma, Suryahadi and Sumarto (2006) and Roebuck et al. (2004). These methods of analysis are suitable for binary response variables such as dropout or graduation. Kinney and Dunson (2006) argue that Logit regression is preferred to Probit regression because it has a more 'intuitive' interpretation of regression coefficients in terms of odds ratios. This problem is also pointed out by Hailpern and Visintainer (2003). They argue (*ibid*: p. 213) that the Probit model "lacks natural interpretation of regression parameters".

Pohlman and Leitner (2003) suggest that OLS regression can also be used if the dependent variable is binary. However, Logit regression has advantages for binary response variables compared to OLS. The main problems with OLS are: (1) predicted probabilities from OLS can lie outside the 0 – 1 interval, (2) the normal distribution will likely be violated with a binary dependent variable, and (3) heteroskedasticity problem. Logit regression does not make any assumptions about the probability distribution of the variable (Hailpern & Visintainer, 2003) and it also overcomes heteroskedasticity problems (Hosmer & Lemeshaw, 2000). A study by Pohlman and Leitner (2003) tries to compare OLS

and Logit regression in explaining high school dropout. In both OLS and Logit regression models, the dependent variables are binary. They conclude that Logit regression provides more precise estimates of probabilities of the dependent outcome, and strongly advise researchers to use Logit regression when modelling the probability of binary outcomes. Therefore in this study, Logit regression is employed as the preferred regression technique.

The probability to drop out is estimated using six models. Model 1 is the benchmark model. It includes 12 explanatory variables that are considered important in case of Indonesia. Model 2 includes the benchmark model and other individual characteristics, model 3 consists of the benchmark model and other family characteristics, model 4 contains the benchmark model and other school characteristics, model 5 consists of the benchmark model and other individual characteristics. Model 6 includes all explanatory variables. In addition, there will be model 7, a preferred model, developed from model 6 that excludes all statistically insignificant variables.

In addition, our study also includes interaction effects. One explanatory variable, i.e. gender, has become the focus of interaction effects. The GOI strives to achieve gender equality in Indonesia. One of the prominent actions to accelerate gender integration in the education sector was to include a strategy of gender equality in the National Education Strategic Plan 2010-2014 (CEDAW, 2011). The strategic plan has shown a tremendous improvement in school enrolments. In 2012, about 36.2% of Indonesian women held a secondary or higher level of education compared to 46.8 % of men (UNDP, 2013). By 2013, this had increased to 39.9% and 49.2%, respectively (UNDP, 2014). This represents about 3.7% growth for females and only about 2.4% growth for males during 2012 – 2013. Therefore, our study emphasises the importance of gender.

Although poverty rates show decreasing trends in the last 10 years, the GOI is still struggling to fight poverty, especially in rural areas. In 2003, poor people made up about 20.2% of the population in rural areas, compared to about 13.6% in urban areas. The latest data, for 2012, indicate the percentages have reduced to, respectively, about 15.2% and 8.7% (Indonesian Central Statistics Agency, 2013). Moreover in 2010, more students located in rural areas dropped out compared to students based in urban areas (Ministry of Women Empowerment and Child Protection & Indonesian Central Statistics Agency, 2012). Furthermore, a study in rural Java shows that students who reside at longer distances from school have lower school attainment, because they must deal with higher costs such as time and money (Mason & Rozelle, 1998). Therefore, this study adds an interaction between rural home location and urban school location in order to examine whether students from rural area that study at urban school have a higher probability to drop out or not.

In our regressions, five interaction effects are explored. They are the interactions between gender and sibling rank, gender and divorced parents, gender and non-working mother, gender and rural home location, and also between urban school location and rural home location.

### **C. Description of variables and summary statistics**

Questionnaire answers from 439 ex-students and 878 parents/guardians' are used for the regression analysis. Appendix Table 1 presents the description and summary statistics for all variables used in the analysis. 21% of respondents are dropout students, consisting of 44 males and 48 females. Almost 60% of the ex-students respondents are female. Ex-students respondents' ages when starting their first year of upper secondary school ranged from 14 years to 20 years. 54% of data were collected from respondents in rural areas. 63.6% of ex-students are from urban upper secondary schools across Central Java Province.

About 26.4% of respondents are from families having the lowest socioeconomic status. Only 6% of household heads hold at least a university degree. Family size ranges from three members to twelve, while sibling rank varies from first child to tenth child in the family. The high number of large families indicates that the traditional Javanese preference for large families still exists.

## **4. MAIN RESULTS**

Before discussing the main results, we have to check whether the model fits the data. First, Table 3 and Appendix Table 2 provide Pseudo  $R^2$ 's for every model. Pseudo  $R^2$ 's are obtained by maximizing the log likelihood function. Model 1 in Table 3 shows a Pseudo  $R^2$  of about 0.18. With additional variables included in the model, the Pseudo  $R^2$  is about 0.40 in model 6. With additional interaction effects in Appendix Table 2, the Pseudo  $R^2$  in model 1 is 0.22 and in model 6 is 0.46. We also employ the goodness-of-fit Pearson test. It indicates that our models fit the data well.

Table 3 presents the estimated coefficients from six Logit models. In general, all statistically significant explanatory variables in each model have similar signs. The discussion starts from individual characteristics. Not surprisingly, in some models, it can be seen that being a female student is more likely to result in dropout. This finding supports previous studies by Ajaja (2012) and Shahidul (2012) at high school level; and by Lloyd, Mensch and Clark (2000) and Regina and Stella (2010) at primary school level. One of the major issues in Indonesia is that upper secondary school students have pre-marital sex and sexually-active female students become pregnant. In turn, female students get married because of the pregnancy. When girls become pregnant, it undoubtedly means

being kicked out of school (CEDAW, 2011: p. 32). Commonly schools view pregnancy before marriage as indicating ‘immoral behavior’ and instead of finding ‘win-win’ solutions for schools and pregnant students, schools prefer to solve the problem as soon as possible by discharging the students. In this sense, although there are many factors indicating the potential to drop out, in fact, many dropout students do not come from groups typically thought of as at-risk.

Higher age at first entry to upper secondary school also significantly contributes to a higher probability to drop out in most of the models. This result is consistent with previous studies (for example Roebuck et al., 2004; South et al., 2007; Terry, 2008; Mo et al., 2013 and Bergeron et al., 2011). In Indonesia, the proportion of students who are older than their classmates in upper secondary school is high. There is a situation where older students are taught in the same class with younger students. This can create psycho-social issues (e.g. problems with self-esteem, bullying, sexual harassment). Older students sometimes have difficulties engaging with younger students in the classroom. Students’ perception about education is also statistically significant in all models. This result support previous studies by Bergeron et al. (2011) and Kaplan, Peck and Kaplan (1997). Moreover, students who repeat a grade while in upper secondary school have a higher likelihood to drop out. However, this explanatory variable is only statistically significant in model 2. Similarly, getting low grades at the previous level of schooling also contributes to a high probability to drop out, compared to students who get average grades. In addition, students who more often changed schools in the past and students with more deviant behaviour have a significantly increased likelihood to drop out. Only one explanatory variable in individual characteristics has a negative sign. As expected, valuing school more is associated with lower probability to dropout. It is found that students’ working experience is not contributing to the decision to drop out.

Turning to family characteristics, most of our models indicate that students from families with lowest socioeconomic status are more likely to drop out. This finding support previous studies by Rumberger and Thomas (2000), Mo et al. (2013), Amadi et al. (2013), Makwina-Morara (2009) and Traag and van der Velden (2011). For poor households, lower secondary school and upper secondary school education costs are approximately 30% of all household spending (Ministry of National Development Planning, 2012). Mainly students from poor families drop out of school because their parents cannot afford to pay for schooling expenditures.

**Table 3. Logit Regressions of School Dropout**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	0.16	0.90**	0.26	0.40	0.21	1.00**
<u>Age at first entry</u>	0.41***	0.22	0.44***	0.47***	0.36**	0.37
<u>Working experiences</u>	0.19	0.17	0.12	0.05	0.21	0.14
<u>Perception of education</u>	-2.36***	-2.10***	-2.32***	-2.33***	-2.56***	-2.17**
Home location (Rural = 1)		0.46				0.68*
Repeat a grade		1.77***				0.72
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.72**				1.17***
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.12				0.33
Changing school experience		0.41**				0.55**
Deviant behaviour		0.61**				0.60**
Health		0.03				0.18
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.64*	0.48	0.76*	0.74*	0.56	0.95**
<u>Household head with at least university degree education</u>	-2.01***	-2.10***	-1.92**	-2.08***	-1.99**	-2.34**
<u>Father's academic supports</u>	0.02	0.002	0.06	0.03	-0.01	0.06
<u>Mother's academic supports</u>	-0.12**	-0.15**	-0.10	-0.14**	-0.12**	-0.16**
<u>Family size</u>	0.22***	0.22***	0.25**	0.23**	0.19**	0.23*
Sibling rank			-0.26*			-0.21
Parents are divorced			0.29			0.10
Non-working mother			-0.27			-0.48
Number of siblings dropping out			0.89***			1.05***
Time helping family with household chores			-0.23			0.28
Time helping family with daily business/work			-0.48			-0.71
Father participation in household decision			-0.03			-0.02
Mother participation in household decision			-0.02			-0.01
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	0.45	0.59*	0.47	0.63*	0.47	1.29***
<u>Relation with teacher:</u>						
<u>Not good</u>	1.53**	1.05	1.25	1.06	1.57**	0.09
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.88***	-0.72**	-1.12***	-0.76**	-0.86**	-0.01***
Bullied by peers and/or teachers				1.74**		1.88***
School's curriculum:						
General				Reference		Reference
Vocational				0.38		0.40
Religious				0.82*		0.52
School's type (Private school = 1)				0.41		0.18
School distance more than 10 km				-0.15		-0.27
Log school's expenditures				0.19		0.25
Teachers' quality				-0.45		-0.33

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-1.10***	-0.88**	-1.32***	-1.10***	-0.98**	-1.47***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.29	-0.14
South					-0.21	-1.85**
Log real minimum wages					-6.61***	-10.65***
Unemployment rate					0.07	0.03
Wald $\chi^2$	83.56***	97.64***	94.30***	111.64***	98.38***	105.96***
Pseudo R <sup>2</sup>	0.18	0.27	0.26	0.23	0.21	0.40
Log Pseudolikelihood	-183.89	-165.20	-165.70	-163.40	-177.75	-127.51
Number of observation	439	439	438	422	439	421

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\* $p \leq 0.05$ ; \* $p \leq 0.10$ . Constant is also included. Reference = reference category; Benchmark explanatory variables are underlined.

In all models household heads with university degree-level education are correlated with lower probability of student dropout. This result shows that educated parents or caregivers who gained the benefit of education themselves will protect their children from dropout as they believe that investment in their children's schooling will produce benefits in the future. Furthermore, higher mothers' support of students' academic activities, not fathers' support, significantly reduces the likelihood to drop out in most of the models.

The estimates indicate that having a higher number of family members significantly increases the probability for a student to drop out in all six models. This finding supports previous studies by Suh and Suh (2011), Yi et al. (2012) and Traag and van der Velden (2011). While our finding shows that bigger family size matters and contributes to dropout, big families are still preferred by some people because they believe in traditional Javanese culture, where the presents of children can carry luck and joy (Zeitlin et al, 1995). In the early 1970s the Government started a famous national campaign of family planning (in Indonesian: *Keluarga Berencana*) with its slogan "Two children are enough" to change the traditional belief. This program reached its success during the 1990s. The average number of children born per woman in 1967 was 5.6. This decreased to 3.3 children in 1987 and further to 2.7 children in 1997 (Chandani, O'Hanlon & Zellner, 2006). However, the GOI admitted that in last 10 years the Family Planning project has failed to control the fertility rate (Antara News, 2013). A national survey conducted in 2010 shows that 0.4% of married women in Indonesia still have more than 10 children (Indonesian Central Statistics Agency, 2010). As our estimates indicate, having a large number of family members can contribute to dropout. It is suggested to start the family planning campaign again, especially targeting poor families.

Also, having more siblings who dropped out of school is likely to increase the probability to drop out. The presence of siblings who dropped out is likely to provide a role model which encourages other siblings to leave school as well. Our findings also suggest that students helping the family with household chores and daily business/work are not associated with the probability to drop out. Further, fathers' and mothers' participation in household decision making does not correlate with dropout.

The estimates for school characteristics indicate that in some of the models, students from urban schools have a significantly higher probability to drop out than those who studied in rural schools. This result supports previous studies by Peraita and Pastor (2000) and Mike et al. (2008). Furthermore, in two models students who have a bad relationship with a teacher are more likely to drop out of school while in all models it is shown that students who have good relationships with teachers are more likely to stay in school (in comparison with those who only have a neutral relationship with teachers). Being bullied by peers and/or teachers significantly increases the likelihood to drop out. Surprisingly, in one out of two models students from Islamic schools are more likely to drop out than students from general schools. With regard to students from private schools, school distance, school expenditure and teachers' quality do not significantly affect the probability to drop out.

Government scholarships for poor students significantly reduce the probability to drop out. This result is consistent with a previous study for Indonesia, i.e. Sparrow (2007), Cameron (2009) and Ha and Mendoza (2010). Also, in one model, students in the southern part of Central Java Province are less likely to drop out compared to their northern counterparts. One explanatory variable with an unexpected sign is the real minimum wage. The study by Montmarquette et al. (2007) shows that minimum wages significantly reduce the probability to drop out, while this study shows the opposite. The reason may be that because every year local governments in Indonesia set minimum wage levels and the amounts are increased proportionally to the inflation rate, there is a possibility that students consider to stay in school because they expect to receive higher wages in the future.

Table 4 indicates marginal effects from Logit regressions without interaction effects. Most of the marginal effect values are similar to the coefficients from OLS regressions (see Appendix Table 4), except for the perception of education variable for which marginal effect values are slightly higher than OLS coefficients. In model 6, estimates can be interpreted to indicate that female students are 7% more likely to drop out than boys. Students who have a good perception of education are 35% less likely to drop out in comparison to those that have a bad perception of education. Students from very poor families are 9% more likely to drop out than students from wealthier families. Having household heads who hold a university degree-level certificate reduces

the probability to dropout by about 9% compared to those who do not hold such a qualification. For every additional member in a family, the risk of dropping out increases by approximately 2%. Students who have a good relationship with teachers are 9% less likely to drop out of school in comparison to those who only have a neutral relationship with teachers.

**Table 4. Marginal Effects from Logit Regressions**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	0.02	0.11***	0.03	0.05	0.03	0.07**
<u>Age at first entry</u>	0.06***	0.03	0.05***	0.06***	0.05**	0.03
<u>Working experiences</u>	0.03	0.02	0.02	0.006	0.03	0.01
<u>Perception of education</u>	-0.50***	-0.43**	-0.48**	-0.48***	-0.54***	-0.35*
Home location (Rural = 1)		0.06				0.05*
Repeat a grade		0.34**				0.07
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.09**				0.11**
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.01				0.03
Changing school experience		0.05**				0.04**
Deviant behaviour		0.08**				0.05**
Health		0.004				0.01
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.10	0.06	0.11*	0.10*	0.08	0.09*
<u>Household head with at least university degree education</u>	-0.15**	-0.14***	-0.13**	-0.14***	-0.14**	-0.09***
<u>Father's academic supports</u>	0.002	-0.0008	0.007	0.004	-0.001	0.004
<u>Mother's academic supports</u>	-0.02**	-0.02**	-0.01	-0.02**	-0.02*	-0.01*
<u>Family size</u>	0.03***	0.03***	0.03**	0.03**	0.02**	0.02*
Sibling rank			-0.03*			-0.02
Parents are divorced			0.04			0.008
Non-working mother			-0.03			-0.04
Number of siblings dropping out			0.11***			0.08***
Time helping family with household chores			-0.03			0.02
Time helping family with daily business/work			-0.07			-0.07
Father participation in household decision			-0.004			-0.001
Mother participation in household decision			-0.002			-0.001
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	0.06*	0.07*	0.05	0.07*	0.06	0.09***
<u>Relation with teacher:</u>						
<u>Not good</u>	0.30*	0.18	0.22*	0.19*	0.30**	0.01
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.13***	-0.10**	-0.16***	-0.10**	-0.12**	-0.09*
Bullied by peers and/or teachers				0.34**		0.28*
School's curriculum:					Reference	Reference
General					Reference	Reference
Vocational					0.05	0.03
Religious					0.12*	0.05

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
School's type (Private school = 1)			0.05		0.01	
School distance more than 10 km			-0.02		-0.02	
Log school's expenditures			0.0002		0.0002	
Teachers' quality			-0.06		-0.03	
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-0.14***	-0.10**	-0.15***	-0.13***	-0.12***	-0.10***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.04	-0.01
South					-0.04	-0.08***
Log real minimum wages					-0.009***	-0.008***
Unemployment rate					0.01	0.01

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\*  $p \leq 0.05$ ; \*  $p \leq 0.10$ . Reference = reference category. Benchmark explanatory variables are underlined.

### Interaction Effects

Logit regressions with interaction effects and their marginal effects are presented in Appendix Tables 2 and 3. It is more complicated to interpret the interaction effects in Logit models compared to OLS. As stated by Ai and Norton (2003), there is an issue with the interpretation of the coefficient of the interaction term in nonlinear models. They screen 13 economics journals listed on JSTOR and review 72 articles using nonlinear models with interaction terms and conclude that all studies misinterpret the interaction term with one exception by DeLeire (2000). Therefore, we aim to apply the right interpretation to those tables in which further manual calculation is needed and the interpretation of our interaction effects is still a work-in-progress.

In general, the main findings from interaction effects between variables are similar to those derived from Table 3 estimates. There are no changes in the signs of explanatory variables compared to the previous models. In comparison, Table 3 shows that being a female student has a higher probability to drop out in only 2 out of 6 models. However, with interaction effects the gender variables are now statistically significant in all models showing that the interaction effects capturing the omitted variable bias and as a result producing better results (see Appendix Table 2). In addition, two explanatory variables that are not statistically significant in Table 3 (Parents are divorced and Non-working mother) are now statistically significant when interaction effects are included. Appendix Table 3 presents marginal effects from Logit regressions with interaction effect. The coefficient estimates are almost identical to those shown in Table 4, except for those variables that interact with other variables.

## **5. ROBUSTNESS OF RESULTS**

This study also employs OLS and Probit regressions as part of the robustness analysis. Using Logit regressions, Using Probit regressions, we find results highly similar to those obtained from Logit regressions, although Probit regressions on occasion produce more significant estimates. Comparing OLS regression results with Logit and Probit regressions, we see that some of the explanatory variables have contradictory impacts on the probability of students for drop out; however they are all statistically insignificant. In Logit regressions, more variables are significant compared to OLS regressions. Overall, Logit and Probit regressions produce more consistent results compared to OLS regressions.

Moreover, OLS is a non-preferred method for this study because some of the predicted probabilities from OLS in all models are outside the 0 – 1 interval (for example, in model 6, 18.5% of predicted probability values fall outside the 0 – 1 interval. To compare Logit and Probit models, we check the percentage of correctly predicted values and see that Logit predicts better within the range 81.13% to 85.51% compared to Probit (range from 80.87% to 85.22%). Therefore we use Logit regression models as our main results.

## **6. POTENTIAL POLICIES IMPLICATIONS**

### **A. Evaluation of existing policies**

There are four National Policies to prevent dropout in Indonesia (Ministry of Education and Culture, 2013), namely: (1) raising public awareness of the importance of education; (2) providing scholarships for poor students continuously from primary school until university level; (3) increasing the monetary value of scholarships for poor students; and (4) increasing the number of poor students being awarded scholarships at university level. These dropout prevention policies are demand side interventions to simulate school enrolment, encourage students to continue their education to the next level and to finish their education. The scholarship programs are targeted solely to poor students. The legal standing for providing the scholarships for the poor is explicitly stated in the national education system Law no. 20/2003. The Law states that the government should provide scholarships for students whose parents cannot afford the costs of education.

The interviews conducted with principals, teachers and dropout students as part of the fieldwork for this study reveal three issues with government's scholarship policies. First, government funding is insufficient to fund all students needing scholarships. Scholarships are being mainly distributed to public school students in priority over private school students. As a result, only a limited number of scholarships received by private schools meant fewer students received funding, leaving others with no choice but to leave school bringing their education to an end. Our survey shows that only 2 out of

20 dropout students from public schools left school because of financial problems, compared to 30 out of 93 respondents from private schools. Second, some students argue that even if they received a scholarship, they would still be burdened by other costs not covered by the scholarship, such as transportation and school supplies costs. Third, even when students receive a scholarship, some parents still ask students to leave school. Parents argue that they still do not have enough money for daily living and they ask students to work and reduce the family's burden.

One of our research findings indicates that government's cash transfer to poor students is highly correlated with lower probability to drop out. Therefore it is vital for the government to expand the number of scholarships recipients and distribute scholarships equally to both public and private schools. It is also important to increase the scholarship amounts so that poor students can cover all costs of schooling. Moreover, the Government needs to offer financial incentives to poor families to keep their children in school.

The other issue is about the target of dropout prevention policies. It is clear that the only target of the government's policies is poor students and that provision of scholarships is seen as the solution to the dropout problem. This is an inaccurate solution because not all students leave school because of financial problems. Our survey in Central Java Province indicates that only 25% of dropouts do so (See Table 2). As seen in the table, pregnancy, being bored and marriage also contribute to the high number of dropouts in Central Java Province. This indicates that dropout students come not only from poor families, but also from wealthier families. Therefore, current policies are not sufficient to solve the dropout problem and other policies are needed to prevent students from dropping out.

## **B. Building an Early Warning System at Upper Secondary School Level with Appropriate Intervention**

Early warning systems to prevent dropout are widely used in the US and Europe. However, to our knowledge, such a system has not been developed in Indonesia. One essential element of students' dropout prevention is the identification of students with high risk characteristics for dropping out. Our research has identified the characteristics that are associated with dropout. We propose to establish an early warning system based on the powerful indicators from significant explanatory variables that can predict dropout. Those variables include gender, age at first entry, home location, previous lower secondary school's national final examination grade, changing school experience, socioeconomic status, household head education, family size, sibling rank, and number of sibling dropping out of school. It has been discussed above that being a female, older age at first

entry, reside in rural area, low national examination grade, higher changing school experience, higher family size and have sibling who dropped out are likely to contribute to a higher probability to drop out. Therefore, it is suggested that schools pay more attention to new students who have those characteristics. Identifying students at risk must begin when students start their first day of upper secondary school so that schools can address the dropout problem at an early stage.

An early warning system is only used to identify students at risk of dropping out. After identifying at-risk students, the next step in combating the dropout problem is providing effective and appropriate intervention strategies. Some significant explanatory variables from our study can be used to inform interventions. These include perception of education, deviant behaviour, parents' academic support, relation with teachers, and bullying activities. There are some possibilities to intervene in these areas. Specific interventions are designed and developed not only for students at risk, but also for their parents and teachers. The main purpose of intervention is to protect students from dropping out, i.e. before it occurs.

a. Interventions aimed at Students

One form of intervention is to raise students' awareness of the importance of education. Our estimates indicate that one important explanatory variable reducing the probability of dropout is perception of education. Students must believe that education will produce benefits for them in the future. It is very important to continuously encourage and motivate students to do their best and stay in school. One example is the protection of female students from becoming pregnant. . It is widely known that in most developed countries pregnant students are still accepted in school, but it is not in Indonesia. CEDAW (2011) reports that the Indonesian government has not implemented any action to guarantee there is no gender bias in dealing with students' pregnancy. It is mainly because Indonesia has the world's largest Muslim population and this religion does not allow girls to get pregnant before marriage. The cultural belief is that sexual activity only occurs within exclusively committed relationships, i.e. marriage. Indonesian society asserts that immoral behaviour has occurred when pregnancy occurs outside marriage. Therefore, it is important that schools inform young females of the likely negative impacts of pregnancy on their first day of school.

b. Interventions aimed at Parents

One of the intervention strategies aimed at parents is to improve the relationship between schools and parents. Schools can establish communication with parents in order to raise parent's awareness of the importance of education. This is particularly

important when families have low socioeconomic status and/or household heads have low levels of education.

Another strategy is to raise awareness of mother's role in children's academic activities. Mothers' support eventually creates a better academic climate for their children.

c. Interventions aimed at Teachers

Interaction between teachers and students occurs every day. Therefore teachers have more understanding of students' characteristics and they also play an important role in creating a better academic environment in schools. It is suggested to teachers to have a good relationship with students and become a second parent in school. Our study shows that students who have good relationships with their teachers tend to stay in school. Students will study harder when they think their teachers care about them.

About 4% of our respondents report that they were victims of bullying and our study shows that bullied students tend to drop out. Therefore, schools have a responsibility to monitor students' deviant behaviours and should provide counselling to these students. Moreover, teachers can also observe bullying behaviour in and out of school and if teachers witness bullying, they need to immediately intervene to stop it. Schools, through principals, teachers and school administrators, need to create anti-bullying campaigns to help inform students about the serious effects of bullying and also repeatedly remind them about the consequences of bullying activities.

## 7. CONCLUDING COMMENTS

This study aims to explain why students at upper secondary school level in Central Java Province decide to drop out of school. We examine the impacts of individual characteristics, family characteristics, school characteristics and Indonesian government policy & macroeconomic condition variables on the likelihood of an individual to complete or drop out of upper secondary school. We employ Logit regressions that are suitable for analysing binary response variables such as dropout or graduation. Some important preliminary results indicate that being a girl, older age at first entry, having home location in a rural area, having low secondary school national examination grades, having changing school experience, having higher family size and have sibling who dropped out are associated with a higher probability to dropout. This study indicates that low socioeconomic status, as a proxy of poverty, also contributes to dropout. Most of the statistically significant

determinants explaining school dropout in Central Java Province are highly consistent with previous studies in other developing countries.

This study has also some implications for policymakers and educators. Our discussion of current government dropout prevention policies concludes that scholarships for the poor are not sufficient to overcome the dropout problem because not all dropout students come from poor families. We suggest the Government to expand the recipients and amounts of scholarships as well as to compensate poor families who keep their children in school. We also encourage the government and educators to create an early warning system to pinpoint students at risk and provide appropriate intervention to prevent students from dropping out.

Finally, it is important to stress that our study is not without limitations. We try to include as many explanatory variables as possible, but still some important variables cannot be included in the model, such as absenteeism and course performance. They should be included in future studies of school dropout in Indonesia

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**Appendix Table 1. Variables' Description and Summary Statistics**

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable: School dropout	A dummy for ex-students denoting whether they dropped out of upper secondary school or not (Dropout = 1, Graduated = 0)	439	0.210	0.407	0	1
<b>Individual Characteristics</b>						
Gender	A dummy for ex-students denoting their gender (Female = 1)	439	0.592	0.492	0	1
Age at first entry	Ex-students' age when they started grade ten at upper secondary school	439	15.651	0.891	14	20
Working experiences	A dummy for ex-students denoting whether they ever earned money when they were at upper secondary school or not	439	0.271	0.445	0	1
Perception of education	A combination of dummy for ex-students denoting whether they think school was a waste of time or not and/or whether they like school or not	439	0.970	0.170	0	1
Home location	A dummy for ex-students denoting their home location (Rural = 1, Urban =0)	439	0.540	0.499	0	1
Repeat a grade	A dummy for ex-students denoting whether they ever repeated a grade while at upper secondary school or not (Yes =1)	439	0.052	0.223	0	1
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)	A dummy for ex-students denoting their Lower Secondary School's national final examination grade was between 5.50 – 7.00	439	0.364	0.482	0	1
Average (Between 7.01 – 8.50)	A dummy for ex-students denoting their Lower Secondary School's national final examination grade was between 7.01 – 8.50	439	0.569	0.496	0	1
High (Above 8.50)	A dummy for ex-students denoting their Lower Secondary School's national final examination grade was above 8.5	439	0.066	0.249	0	1
Changing school experience	Indicate how many times ex-students changed school since primary school	439	0.273	0.698	0	4
Deviant behaviour	Sum of ex-students' responses to the following six items:	439	0.337	0.791	0	4
	fought with peers or other students at upper secondary school (yes=1)	439			0	1
	smoking/drinking at upper secondary school (yes=1)	439			0	1
	using illegal drug or not at upper secondary school (yes=1)	439			0	1
	warned by principal or teachers because of their deviant behaviour at upper secondary school (yes=1)	439			0	1
	arrested by the Police at upper secondary school (yes=1)	439			0	1
Health	suspended from school at upper secondary school (yes=1)	439			0	1
	Indicate ex-students' health condition while they were in upper secondary school (excellent health = 0 up to poor health =4)	439	1.973	0.679	0	4
<b>Family Characteristics</b>						
Lowest socioeconomic status	A dummy for families with lowest socioeconomic status	439	0.264	0.441	0	1
Household Head with at least university degree	Indicates the household head has a university degree	439	0.064	0.245	0	1

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Father's academic supports	Sum of father's responses to following three questions: Have you ever encouraged your child to study well in school and stay in school? Have you ever talked/discussed with teachers about your child's development/activities in school? Have you ever been able to help with your child's homework?	439	6.920	2.918	0	15
Mother's academic supports	Sum of mother's responses to following three questions: Have you ever encouraged your child to study well in school and stay in school? Have you ever talked/discussed with teachers about your child's development/activities in school? Have you ever been able to help with your child's homework?	439	7.344	2.858	0	15
Family size	Indicate number of household members (including household head)	439	5.132	1.512	3	12
Sibling rank	Indicate students' sibling rank in the family	439	2.251	1.400	1	10
Parents are divorced	A dummy for ex-students denoting that their parents were divorced while they were attending upper secondary school	439	0.011	0.106	0	1
Non-working mother	A dummy to indicate that mother was not working while ex-students were attending upper secondary school	439	0.608	0.489	0	1
Number of siblings dropping out	Indicate how many siblings dropped out at any level of school	439	0.280	0.759	0	4
Time helping family with household chores	A dummy for ex-students denoting whether they helped their parents / guardians with household chores after returning from school (yes = 1)	439	0.970	0.170	0	1
Time helping family with daily business/work	A dummy for ex-students denoting that they helped their parents'/guardians' daily business/work after returning from school (yes = 1)	439	0.872	0.334	0	1
Father participation in household decision	Sum of father's responses to following four questions: How often do you participate in household expenditure decisions? How often do you participate in decisions about educational matters regarding the children? How often do you participate in decisions about household labour regarding the children? How often do you participate in decisions regarding health care for children?	438	15.121	3.817	4	20
Mother participation in household decision	Sum of mother's responses to following four questions: How often do you participate in household expenditure decisions? How often do you participate in decisions about educational matters regarding the children? How often do you participate in decisions about household labour regarding the children? How often do you participate in decisions regarding health care for children	439	16.961	3.060	4	20
<b>School Characteristics</b>						
School location	A dummy for ex-students denoting their upper secondary school location (Urban = 1)	439	0.636	0.482	0	1
Relation with teacher:						
Not good	A dummy for ex-students denoting that their relationship with their teacher at upper secondary school was not good	439	0.032	0.176	0	1

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Neutral	A dummy for ex-students denoting that their relationship with their teacher at upper secondary school was neutral	439	0.273	0.446	0	1
Good	A dummy for ex-students denoting that their relationship with their teacher at upper secondary school was good	439	0.695	0.461	0	1
Bullied by Peers and/or teachers	A dummy for ex-students denoting whether they were bullied by peers or teachers or not at upper secondary school (yes=1)	439	0.041	0.199	0	1
School's curriculum:						
General	A dummy denoting that ex-student's school curriculum is general	439	0.346	0.476	0	1
Vocational	A dummy denoting that ex-student's school curriculum is vocational	439	0.453	0.498	0	1
Religious	A dummy denoting that ex-student's school curriculum is religious	439	0.200	0.401	0	1
School's type	A dummy denoting ex-student's upper secondary school type (Private school = 1)	439	0.768	0.423	0	1
School distance more than 10 km	A dummy denoting that ex-student's last school was more than 10 km from their home	439	0.173	0.379	0	1
Log School's expenditures	Log of average annual school's expenditures	422	15.078	0.588	12.206	17.063
Teachers' quality	A dummy for ex-students denoting their teachers' quality (good=1)	439	0.661	0.474	0	1
<b>Government Policy &amp; Macroeconomics Conditions</b>						
Government's cash transfer to poor students	A dummy for ex-students denoting whether they received money from the Government's Poor Students Assistance program or not at upper secondary school (yes=1)	439	0.374	0.484	0	1
Part of Central Java Province:						
North	A dummy denoting the ex-student's home being located in the northern part of Central Java Province	439	0.472	0.500	0	1
Central	A dummy denoting the student's home being located in the central part of Central Java Province	439	0.437	0.497	0	1
South	A dummy denoting the ex-student's home being located in the southern part of Central Java Province	439	0.091	0.288	0	1
Log real minimum wages	Log of real minimum wages from each regency and city in Central Java Province are obtained by deflating nominal minimum wages by Central Java Province's consumer price Index. Minimum wages based on student's home location and last year of study. Data are from Indonesia Central Statistical Agency.	439	8.772	0.085	8.641	9.045
Unemployment rate	Unemployment rate for each regency and city in Central Java Province. Unemployment rate is applied to the student based on student's home location and last year of study. Data from Indonesia Central Statistical Agency.	439	6.562	1.824	2.97	14.22

**Appendix Table 2. Logit Regressions with Interaction Effects**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	2.71***	4.80***	3.34***	3.59***	2.10***	4.51***
<u>Age at first entry</u>	0.37**	0.16	0.38**	0.46***	0.31*	0.34*
<u>Working experiences</u>	0.34	0.34	0.31	0.22	0.36	0.22
<u>Perception of education</u>	-2.56***	-2.64***	-2.52***	-2.71***	-2.82***	-3.17***
<u>Home location (Rural = 1)</u>	1.46	2.33**	2.09**	1.95*	1.57	3.38**
Repeat a grade		2.05***				0.94
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.85***				1.30***
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.42				0.02
Changing school experience		0.43**				0.55**
Deviant behaviour		0.73***				0.79***
Health		0.07				0.27
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.73*	0.56	0.97**	0.83*	0.65	1.21**
<u>Household head with at least university degree education</u>	-1.86**	-1.81**	-1.72**	-1.90**	-1.83**	-1.77*
<u>Father's academic supports</u>	0.004	-0.01	0.02	0.02	-0.001	0.06
<u>Mother's academic supports</u>	-0.12**	-0.16**	-0.08	-0.15**	-0.12*	-0.18**
<u>Family size</u>	0.31***	0.32***	0.30**	0.30**	0.29**	0.32**
<u>Sibling rank</u>	0.22	0.30	0.11	0.31	0.24	0.41
Parents are divorced	-10.89***	-10.80***	-13.31***	-11.06***	-10.79***	-10.75***
<u>Non-working mother</u>	-0.93**	-1.92***	-0.75	-1.30**	-0.82*	-1.94***
Number of siblings dropping out			1.11***			1.39***
Time helping family with household chores			-0.54			-0.32
Time helping family with daily business/work			-0.45			-0.38
Father participation in household decision			-0.02			-0.05
Mother participation in household decision			-0.06			-0.04
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	1.26	1.56*	1.68*	1.76*	1.12	2.54**
<u>Relation with teacher:</u>						
<u>Not good</u>	1.31*	0.74	1.01	0.78	1.36**	-0.80
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.93***	-0.78**	-1.12***	-0.90**	-0.90***	-1.16**
Bullied by peers and/or teachers				2.00**		2.24**
School's curriculum:						
General				Reference		Reference
Vocational				0.30		0.18
Religious				1.02**		0.58
School's type (Private school = 1)				0.43		0.05
School distance more than 10 km				-0.12		0.10
Log school's expenditures				0.16		0.05
Teachers' quality				-0.40		-0.02

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-1.21***	-1.02**	-1.57***	-1.26***	-1.12***	-2.04***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.33	-0.29
South					-0.07	-1.86 ***
Log real minimum wages					-6.37***	-9.50***
Unemployment rate					0.13	0.11
<b>Interaction Effects</b>						
<u>Female * Sibling rank</u>	-0.61***	-0.66**	-0.80***	-0.64**	-0.63***	-1.10***
<u>Female * Parents are divorced</u>	11.91***	11.54***	14.71***	12.32***	11.63***	11.43***
<u>Female * Non-working mother</u>	0.95	1.92***	0.93	1.40**	0.81	2.20**
<u>Female * Home location (Rural = 1)</u>	-0.91	-1.43*	-1.28**	-1.26*	-1.20*	-2.34***
<u>School location (Urban =1) * Home location (Rural = 1)</u>	-0.66	-0.99	-1.23	-0.96	-0.50	-1.28
Wald $\chi^2$	262.69***	310.92***	364.13***	277.20***	381.31***	339.61***
Pseudo R <sup>2</sup>	0.22	0.32	0.31	0.28	0.25	0.46
Log Pseudolikelihood	-174.74	-152.91	-154.42	-152.98	-168.08	-112.58
Number of observation	439	439	438	422	439	421

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\*  $p \leq 0.05$ ; \*  $p \leq 0.10$ . Constant is also included. Reference = reference category; Benchmark explanatory variables are underlined.

**Appendix Table 3. Marginal Effects From Logit with Interaction Effects**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	0.30***	0.47***	0.34***	0.35***	0.22***	0.28***
<u>Age at first entry</u>	0.05**	0.02	0.04**	0.05**	0.04*	0.02*
Working experiences	0.04	0.04	0.03	0.02	0.04	0.01
<u>Perception of education</u>	-0.53***	-0.52***	-0.50***	-0.54***	-0.59***	-0.53**
<u>Home location (Rural = 1)</u>	0.18	0.24**	0.22**	0.21*	0.18	0.23*
Repeat a grade		0.37***				0.08
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.10***				0.09**
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.04				0.001
Changing school experience		0.04**				0.03**
Deviant behaviour		0.07***				0.05***
Health		0.01				0.02
<b>Family Characteristics</b>						
<u>Lowest Socioeconomic Status</u>	0.10*	0.06	0.13**	0.10*	0.08	0.09**
<u>Household head with at least university degree education</u>	-0.13***	-0.10***	-0.11***	-0.11***	-0.12***	-0.06***
<u>Father's academic supports</u>	0.0004	-0.001	0.003	0.002	-0.0001	0.003
<u>Mother's academic supports</u>	-0.02**	-0.02**	-0.01	-0.02**	-0.01**	-0.01**
<u>Family Size</u>	0.04***	0.03***	0.03**	0.03**	0.03**	0.02**
<u>Sibling rank</u>	0.03	0.03	0.01	0.03	0.03	0.02
<u>Parents are divorced</u>	-0.16***	-0.13***	-0.14***	-0.14***	-0.15***	-0.07***
<u>Non-working mother</u>	-0.11**	-0.18***	-0.08*	-0.13***	-0.09*	-0.10**
Number of siblings dropping out			0.12***			0.08***
Time helping family with household chores				-0.07		-0.02
Time helping family with daily business/work				-0.06		-0.03
Father participation in household decision				-0.002		-0.003
Mother participation in household decision				-0.01		-0.002
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	0.14	0.14*	0.16*	0.17**	0.11	0.13**
<u>Relation with teacher:</u>						
<u>Not good</u>	0.24*	0.10	0.15	0.11	0.24	-0.03
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.13***	-0.09**	-0.14***	-0.11**	-0.12***	-0.08**
Bullied by peers and/or teachers				0.37**		0.31
School's curriculum:						
General				Reference		Reference
Vocational				0.03		0.01
Religious				0.14*		0.04
School's type (Private school = 1)				0.05		0.003
School distance more than 10 km				-0.01		0.006
Log school's expenditures				0.0002		0.00003
Teachers' quality				-0.05		-0.001

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
Government's cash transfer to poor students	-0.09***	-0.15***	-0.12***	-0.12***	-0.10***	
Part of Central Java Province:						
North					Reference	Reference
Central					-0.04	-0.02
South					-0.01	-0.06***
Log real minimum wages					-0.007***	-0.006***
Unemployment rate					0.01	0.006
<b>Interaction Effects</b>						
<u>Female * Sibling rank</u>	-0.08***	-0.07**	-0.09***	-0.07**	-0.07***	-0.06***
<u>Female * Parents are divorced</u>	0.87***	0.90***	0.90***	0.89***	0.88***	0.94***
<u>Female * Non-working mother</u>	0.11*	0.17***	0.09	0.13**	0.11	0.22*
<u>Female * Home location (Rural = 1)</u>	-0.10*	-0.12**	-0.12**	-0.12*	-0.12**	-0.11***
<u>School location (Urban =1) * Home location (Rural = 1)</u>	-0.07	-0.09	-0.10	-0.09	-0.05	-0.06

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\* $p \leq 0.05$ ; \* $p \leq 0.10$ . Reference = reference category. Benchmark explanatory variables are underlined.

**Appendix Table 4. OLS Regressions**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	0.02	0.09**	0.02	0.04	0.02	0.07**
<u>Age at first entry</u>	0.06**	0.02	0.05**	0.06**	0.05**	0.03
<u>Working experiences</u>	0.03	0.03	0.01	0.005	0.02	-0.01
<u>Perception of education</u>	-0.43***	-0.33***	-0.38***	-0.40***	-0.45***	-0.27***
Home location (Rural = 1)		0.05				0.05
Repeat a grade		0.32 ***				0.16
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.09**				0.09**
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.01				0.04
Changing school experience		0.05*				0.06**
Deviant behaviour		0.09***				0.07**
Health		0.00002				0.01
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.10*	0.07	0.10**	0.11**	0.08*	0.08*
<u>Household head with at least university degree education</u>	-0.15***	-0.15***	-0.14***	-0.14***	-0.15***	-0.15***
<u>Father's academic supports</u>	0.001	-0.001	0.01	0.003	0.002	0.01
<u>Mother's academic supports</u>	-0.02**	-0.02**	-0.01	-0.02**	-0.02**	-0.01
<u>Family size</u>	0.03**	0.03**	0.03*	0.03**	0.02*	0.02
Sibling rank			-0.03**			-0.02
Parents are divorced			0.002			0.001
Non-working mother			-0.03			-0.05
Number of siblings dropping out			0.15***			0.12***
Time helping family with household chores			-0.05			-0.003
Time helping family with daily business/work			-0.05			-0.06
Father participation in household decision			-0.003			-0.004
Mother participation in household decision			-0.004			-0.002
<b>School Characteristics</b>						
School location (Urban = 1)	0.06*	0.07	0.06*	0.07*	0.07**	0.11**
Relation with teacher:						
Not good	0.31**	0.20	0.26*	0.20*	0.31**	0.07
Neutral	Reference	Reference	Reference	Reference	Reference	Reference
Good	-0.13***	-0.10**	-0.15***	-0.11**	-0.13***	-0.11**
Bullied by peers and/or teachers			0.31**			0.23*
School's curriculum:						
General			Reference			Reference
Vocational			0.04			0.03
Religious			0.10**			0.06
School's type (Private school = 1)			0.03			0.002
School distance more than 10 km			-0.02			-0.03
Log school's expenditures			0.03			0.02
Teachers' quality			-0.05			-0.04

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-0.15***	-0.13***	-0.16***	-0.15***	-0.14***	-0.13***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.04	-0.04
South					-0.001	-0.14*
Log real minimum wages					-0.63***	-0.70***
Unemployment rate					0.01	-0.01
F-Stat	12.21***	11.51***	9.59***	9.66***	6.63***	5.47***
R <sup>2</sup>	0.19	0.28	0.27	0.24	0.21	0.36
Adjusted R <sup>2</sup>	0.17	0.24	0.23	0.20	0.18	0.29
Number of observation	439	439	438	422	439	421
Jarque-Bera normality test	108.82***	93.82***	90.41***	98.15***	100.97***	73.76***

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\*  $p \leq 0.05$ ; \*  $p \leq 0.10$ . Constant is also included. Reference = reference category; Benchmark explanatory variables are underlined.

**Appendix Table 5. OLS Regressions with Interaction Effects**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	0.30***	0.38***	0.32***	0.35***	0.23***	0.27***
<u>Age at first entry</u>	0.05**	0.01	0.04**	0.05**	0.04*	0.02
<u>Working experiences</u>	0.04	0.03	0.02	0.02	0.03	0.01
<u>Perception of education</u>	-0.42***	-0.32***	-0.36***	-0.39***	-0.44***	-0.28***
<u>Home location (Rural = 1)</u>	0.11	0.15	0.15*	0.13	0.12	0.17*
Repeat a grade		0.33***				0.14
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.08**				0.08*
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.05				0.003
Changing school experience		0.05*				0.06*
Deviant behaviour		0.09***				0.07**
Health		0.01				0.02
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.10**	0.07	0.11**	0.12**	0.09*	0.09*
<u>Household head with at least university degree education</u>	-0.15***	-0.16***	-0.14***	-0.14***	-0.15***	-0.14***
<u>Father's academic supports</u>	0.00	-0.002	0.002	0.001	0.0002	0.003
<u>Mother's academic supports</u>	-0.02**	-0.02**	-0.01	-0.02**	-0.02**	-0.01
<u>Family size</u>	0.04**	0.03**	0.03**	0.03**	0.03**	0.02
<u>Sibling rank</u>	0.04	0.03	0.02	0.04*	0.04	0.03
Parents are divorced	-0.09	0.01	-0.26*	-0.05	-0.06	-0.13
<u>Non-working mother</u>	-0.11**	-0.15***	-0.09*	-0.13**	-0.10*	-0.13***
Number of siblings dropping out			0.15***			0.13***
Time helping family with household chores			-0.09			-0.03
Time helping family with daily business/work			-0.05			-0.05
Father participation in household decision			-0.002			-0.004
Mother participation in household decision			-0.01			-0.004
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	0.11	0.11	0.15*	0.12	0.10	0.16*
<u>Relation with teacher:</u>						
<u>Not good</u>	0.28**	0.16	0.23*	0.17	0.28**	0.05
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.13***	-0.09**	-0.13***	-0.11**	-0.12***	-0.10**
Bullied by peers and/or teachers				0.32**		0.22*
School's curriculum:						
General				Reference		Reference
Vocational				0.03		0.02
Religious				0.11**		0.07
School's type (Private school = 1)				0.03		0.001
School distance more than 10 km				-0.02		-0.03
Log School's expenditures				0.03		0.02
Teachers' quality				-0.04		-0.02

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-0.16***	-0.13***	-0.17***	-0.16***	-0.14***	-0.14***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.05	-0.04
South					-0.01	-0.12
Log real minimum wages					-0.62***	-0.64***
Unemployment rate					0.02	0.002
<b>Interaction Effects</b>						
<u>Female * Sibling rank</u>	-0.08***	-0.07***	-0.09***	-0.08**	-0.09***	-0.08***
<u>Female * Parents are divorced</u>	0.23	0.10	0.44	0.21	0.18	0.25
<u>Female * Non-working mother</u>	0.10	0.14**	0.10	0.13*	0.09	0.14**
<u>Female * Home location (Rural = 1)</u>	-0.08	-0.10	-0.10	-0.12	-0.11	-0.14**
<u>School location (Urban =1) * Home location (Rural = 1)</u>	-0.02	-0.05	-0.09	-0.03	-0.01	-0.06
F-Stat	7.72***	8.99***	8.23***	6.82***	8.39***	8.23***
R <sup>2</sup>	0.22	0.30	0.30	0.27	0.25	0.39
Adjusted R <sup>2</sup>	0.18	0.26	0.25	0.22	0.20	0.32
Number of observation	439	439	438	422	439	421
Jarque-Bera Normality Test	97.60***	84.80***	79.33***	86.44***	89.78***	66.73***

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\* $p \leq 0.05$ ; \* $p \leq 0.10$ . Constant is also included. Reference = reference category; Benchmark explanatory variables are underlined.

**Appendix Table 6. Probit Regressions**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	0.12	0.50***	0.15	0.25	0.15	0.59***
<u>Age at first entry</u>	0.25***	0.12	0.26***	0.28***	0.23***	0.18
<u>Working experiences</u>	0.10	0.08	0.07	0.03	0.10	0.06
<u>Perception of education</u>	-1.46***	-1.28***	-1.39***	-1.43***	-1.56***	-1.29***
Home location (Rural = 1)		0.27				0.37*
Repeat a grade		0.99***				0.40
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.43***				0.65***
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.04				0.20
Changing school experience		0.22**				0.31**
Deviant behaviour		0.34***				0.33***
Health		0.01				0.09
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.36*	0.28	0.43**	0.44**	0.31	0.55**
<u>Household Head with at least university degree education</u>	-1.19***	-1.23***	-1.11***	-1.25***	-1.19***	-1.40***
<u>Father's academic supports</u>	0.01	0.005	0.03	0.02	0.01	0.03
<u>Mother's academic supports</u>	-0.07**	-0.09***	-0.06*	-0.08**	-0.07**	-0.09*
<u>Family size</u>	0.12**	0.13***	0.14**	0.13***	0.11**	0.14*
Sibling rank			-0.14*			-0.10
Parents are divorced			0.21			0.04
Non-working mother			-0.12			-0.21
Number of siblings dropping out			0.52***			0.58***
Time helping family with household chores			-0.16			0.15
Time helping family with daily business/work			-0.26			-0.37
Father participation in household decision			-0.02			-0.01
Mother participation in household decision			-0.01			-0.01
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	0.27*	0.33*	0.30*	0.38*	0.29*	0.71***
<u>Relation with teacher:</u>						
<u>Not good</u>	0.92***	0.61	0.71	0.60	0.95**	0.05
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.51***	-0.43**	-0.63***	-0.45**	-0.50***	-0.56**
Bullied by Peers and/or teachers				1.03**		1.07**
School's curriculum:						
General				Reference		Reference
Vocational				0.23		0.14
Religious				0.48**		0.23
School's type (Private school = 1)				0.23		0.17
School distance more than 10 km				-0.08		-0.14
Log school's expenditures				0.12		0.11
Teachers' quality				-0.28		-0.21

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-0.60***	-0.50**	-0.73***	-0.64***	-0.55***	-0.85***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.15	-0.07
South					-0.13	-0.99***
Log real minimum wages					-3.77***	-5.75***
Unemployment rate					0.04	0.03
Wald $\chi^2$	93.80***	112.50***	107.78***	124.43***	109.56***	127.00***
Pseudo R <sup>2</sup>	0.19	0.27	0.26	0.24	0.22	0.40
Log Pseudolikelihood	-183.23	-164.29	-164.84	-162.03	-176.94	-127.04
Number of observation	439	439	438	422	439	421

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\* $p \leq 0.05$ ; \* $p \leq 0.10$ . Constant is also included. Reference = reference category; Benchmark explanatory variables are underlined.

**Appendix Table 7. Probit Regressions with Interaction Effect**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Individual Characteristics</b>						
<u>Gender (Female = 1)</u>	1.54***	2.62***	1.89***	1.97***	1.18***	2.52***
<u>Age at first entry</u>	0.23***	0.10	0.22**	0.27***	0.21**	0.18*
<u>Working experiences</u>	0.17	0.17	0.16	0.11	0.17	0.15
<u>Perception of education</u>	-1.56***	-1.55***	-1.52***	-1.60***	-1.69***	-1.86***
<u>Home location (Rural = 1)</u>	0.78	1.23**	1.10**	1.09**	0.79	1.92***
Repeat a grade		1.11***				0.48
Lower Secondary School's national final examination grade:						
Low (Between 5.01 – 7.00)		0.50***				0.73***
Average (Between 7.01 – 8.50)		Reference				Reference
High (Above 8.50)		-0.22				-0.02
Changing school experience		0.24**				0.31**
Deviant behaviour		0.42***				0.47***
Health		0.04				0.13
<b>Family Characteristics</b>						
<u>Lowest socioeconomic status</u>	0.41*	0.30	0.55**	0.49**	0.36	0.68***
<u>Household head with at least university degree education</u>	-1.11***	-1.10***	-1.01***	-1.14***	-1.10***	-1.14**
<u>Father's academic supports</u>	0.01	0.001	0.01	0.02	0.01	0.03
<u>Mother's academic supports</u>	-0.08**	-0.09***	-0.05	-0.09**	-0.07**	-0.10*
<u>Family size</u>	0.17***	0.17***	0.16**	0.16**	0.15**	0.18**
<u>Sibling rank</u>	0.12	0.15	0.07	0.17	0.14	0.24*
<u>Parents are divorced</u>	-3.61***	-2.64***	-4.08***	-3.28***	-2.80***	-2.57**
<u>Non-working mother</u>	-0.54**	-1.06***	-0.44*	-0.71**	-0.45*	-1.09***
Number of siblings dropping out			0.62***			0.77***
Time helping family with household chores			-0.35			-0.17
Time helping family with daily business/work			-0.23			-0.18
Father participation in household decision			-0.01			-0.02
Mother participation in household decision			-0.03			-0.03
<b>School Characteristics</b>						
<u>School location (Urban = 1)</u>	0.71	0.86*	0.94*	1.01**	0.62	1.43**
<u>Relation with teacher:</u>						
<u>Not good</u>	0.78*	0.34	0.53	0.40	0.82**	-0.51
<u>Neutral</u>	Reference	Reference	Reference	Reference	Reference	Reference
<u>Good</u>	-0.53***	-0.44**	-0.63***	-0.52***	-0.52***	-0.65***
Bullied by Peers and/or teachers				1.12***		1.22***
School's curriculum:						
General				Reference		Reference
Vocational				0.21		0.01
Religious				0.60**		0.29
School's type (Private school = 1)				0.24		0.11
School distance more than 10 km				-0.05		0.03
Log school's expenditures				0.09		0.02
Teachers' quality				-0.22		-0.03

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>Government Policy &amp; Macroeconomics Conditions</b>						
<u>Government's cash transfer to poor students</u>	-0.64***	-0.56***	-0.87***	-0.71***	-0.60***	-1.16***
Part of Central Java Province:						
North					Reference	Reference
Central					-0.19	-0.18
South					-0.08	-1.01**
Log real minimum wages					-3.69***	-5.28***
Unemployment rate					0.07	0.05
<b>Interaction Effects</b>						
<u>Female * Sibling rank</u>	-0.34***	-0.36***	-0.43***	-0.34***	-0.36***	-0.61***
<u>Female * Parents are divorced</u>	4.18***	3.02***	4.88***	3.97***	3.26***	3.00**
<u>Female * non-working mother</u>	0.56*	1.07***	0.57*	0.75**	0.46	1.30***
<u>Female * Home location (Rural = 1)</u>	-0.48	-0.72*	-0.72**	-0.69*	-0.61*	-1.33***
<u>School location (Urban =1) * Home location (Rural = 1)</u>	-0.35	-0.54	-0.63	-0.54	-0.21	-0.76
Wald $\chi^2$	438.49***	447.99***	464.12***	449.15***	480.48***	463.43***
Pseudo R <sup>2</sup>	0.23	0.32	0.31	0.29	0.26	0.47
Log Pseudolikelihood	-174.40	-152.66	-153.82	-152.27	-167.75	-113.25
Number of observation	439	439	438	422	439	421

Notes: Dependent Variable: School dropout (Dropout = 1, Graduated = 0); \*\*\* $p \leq 0.01$ ; \*\*  $p \leq 0.05$ ; \*  $p \leq 0.10$ . Constant is also included. Reference = reference category; Benchmark explanatory variables are underlined.