

DISCUSSION PAPER SERIES

IZA DP No. 11362

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ABSTRACT

Madrasah for Girls and Private School for Boys? The Determinants of School Type Choice in Rural and Urban Indonesia*

Using a nationally representative data set of Indonesian households and villages, we study the determinants of enrolment in Islamic schools (i.e., madrasahs) and private non-religious vis-à-vis public non-religious schools. Multinomial logit estimates indicate that madrasahs systematically attract children from poorer households, rural locations, and less educated parents while the opposite is true for private school enrolment. Moreover, girls are significantly more likely to be in madrasahs, irrespective of their locations, while boys enjoy a higher probability of enrolment in non-madrasah schools, particularly in urban areas. A significant effect of household income remains even after factoring out the influence of child characteristics, parental background, and village characteristics. Therefore policies that reduce household poverty are likely to reduce demand for Islamic schooling. However, the presence of a “girl effect” in madrasah enrolment independent of household income and location factors is puzzling and underscores the need to better understand the socio-cultural determinants of school choice in Indonesia.

JEL Classification: D04, I21, O15

Keywords: gender, madrasah education, poverty, private school, Indonesia

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* An earlier version of the paper was presented in seminars at SMERU Research Institute, the University of Indonesia, and the Asia-Pacific Population (APA) 3rd International Conference in Malaysia. We also acknowledge comments received from participants in the 4th Annual South-East Asia Studies Symposium at Sunway University, Malaysia. Silva Berlus Coni provided excellent research support. The usual disclaimers apply.

1. Introduction

Indonesia is home to the largest Islamic education system in the world where thousands of madrasahs exclusively cater to the educational needs of children from Muslim households. As a matter of fact, Indonesia belongs to a regional belt, stretching from North and West Africa to South and South-East Asia, including countries like Egypt, Nigeria, Pakistan, Afghanistan and Bangladesh, where the madrasah system of education is thriving (Aznar 2003; Coulson, 2004; Hefner and Zaman, 2007; Atran, Magouirk and Ginges, 2008; van Bruinessen, 2008; Izama, 2014; Asadullah and Chuahdury 2016). However, madrasahs are often accused of promoting extreme political and religious views and gender norms (Anshor, 2006; Asadullah and Chaudhury, 2010)ⁱ. The large presence of Islamic schools in Muslim countries, therefore, raises an important question: why do households choose to send their children to madrasahs? The common perception is that madrasah attendance is higher in rural locations and driven by household poverty and/or cost-related concerns (Parker and Raihani 2009). If true, madrasah choice has important policy implications given that Indonesia, Bangladesh and Pakistan host over half a billion people most of whom live in rural areas and on less than two dollars a day. Identifying the determinants of Islamic school attendance vis-a-vis non-madarash schools is crucial for understanding parental choice in poor Muslim communities throughout South-East Asia. Country-specific knowledge of the determinants can guide appropriate policy design to ensure that these countries capitalize on the opportunity to reap benefits from the demographic dividend by improving the quality of available human resources.

Indonesia's madrasah system is unique in the Muslim world for several reasons. First, the majority of the country's madrasahs are in the non-state sector, in

most cases teaching Arabic religious texts alongside a non-religious curriculum.ⁱⁱ Yet they belong to centralized bureaucracies, associated with Indonesia's two leading Muslim organizations, *Muhammadiyah* and *Nahdlatul Ulama* (NU) (Hasan 2008; van Bruinessen 2008). Second, Indonesian madrasahs have been open to girls for nearly a century. Both *Muhammadiyah* and NU maintain a nationwide network of madrasahs led by women who interpret sacred texts and exert powerful religious influence (van Doorn-Harder 2006). This is in stark contrast with madrasahs in South Asia which were until recently all-male institutions. Third, a large number of fee-charging non-religious private schools operate throughout Indonesia alongside madrasahs. The large size and heterogeneous composition of the non-state education sector are despite a large-scale public school construction programme undertaken in the country in the past (Dufflo, 2001). Therefore, compared to most other Muslim countries in Asia, Indonesian households face a different mix of schools comprising of madrasahs, non-religious private and public schools. In other words, households can choose a private school/madrasah, one that operates independently, or send their children to a government-aided school or madrasah (Stern and Smith 2016). Fourth, Indonesia's fragmented geography means that the availability of alternatives to madrasahs may vary across regions. Regional disparities remain in student access and educational quality in remote and poor areas (OECD/Asian Development Bank 2015). More integrated, urbanized, and prosperous regions (compared to less developed and poorer provinces) may benefit from the presence of private schools widening the available range of school types. In other words, the mix of schools differs depending on the household's place of residence.

The above features of the country's education sector present a rich institutional context for studying madrasah enrolment decisions. Yet, research on

madrasah choice in Indonesia is limited. Compared to government non-religious schools and madrasahs, these schools are underfunded and rely on teachers many of whom are uncertified and lack professional development. Private non-religious schools and madrasahs also perform relatively poorly in public examinations. Yet demand for these educational institutions is high and they significantly cater to the educational needs of children from low-income families (Stern and Smith 2016). While studies have examined the determinants of school enrolment decisions (e.g., Pradhan 1998; Takahashi 2011) or academic achievement (e.g., Newhouse and Beegle 2003; Suryadarma et al. 2006) in Indonesia, none looks at the correlates of school type choice. Two exceptions are Chen (2004) and Permani (2011a).ⁱⁱⁱ Chen (2004) does not directly study school choice in Indonesia. However, his empirical analysis of the Asian financial crisis finds that madrasah attendance serves as a form of insurance in times of crisis. Economic distress stimulates Koran study and Islamic school attendance but does not stimulate non-religious school attendance. Permani (2011a) attributes the demand for madrasah education to household religiosity, among other factors. However, the study does not analyze madrasah enrolment decision vis-a-vis different types of schools.^{iv} As such, little is known about the factors that shape children's enrolment into religious and non-religious schools in Indonesia and how that varies by location.

Indonesia's madrasah sector is unique in the Muslim world for its historically pro female orientation (van Doorn-Harder 2006). Quran literacy gained from madrasah education can be valuable traits for a woman as it enables mothers to socialise their children in rural communities (Rao and Hussain, 2011). At the same time, many madrasahs in Indonesia continue to be influenced by traditional patriarchal values, and male-dominated religious interpretations (Abdalla et al. 2006).

Madrasah education can inculcate traditional values in girls by helping them become a “better wife” (Raynor 2005; 2008). Madrasah attendance may transmit values such as obedience, selflessness, and submission (Lukens-Bull, 2000; 2001) which are demanded by prospective grooms in the marriage market (Winkelman, 2005).^v However, research exploring the effect of gender on madrasah choice in Indonesia is lacking.

In this paper, we test some of the common explanations for madrasah attendance, including the role of gender, using data from a very large household socio-economic survey, SUSENAS, which contains information on children’s enrolment status by school types. The survey covers all provinces of Indonesia and spans rural as well as urban areas. An important limitation of SUSENAS is the lack of any supply-side information. We overcome this deficit by merging SUSENAS data with village census records (PODES) which contains information on school availability at the village level. The combined SUSENAS-PODES dataset for the year 2005, therefore, allows us to empirically investigate the determinants of madrasah and private non-religious school enrolment vis-à-vis public non-religious schools in Indonesia with a focus on household, child and community characteristics. In doing so, we also contribute to the developing country literature on the determinants of children’s school participation and school type attended by gender (Binder, 1998; Glick and Sahn 2000; Tuwor, Theresa and Sossou, Marie-Antoinette 2008; Takahashi 2011; Ajayi and Buessing, 2015; Goensch, 2016) and gender difference in school choice in particular (e.g. Srivastava, 2006; Azam and Kingdon, 2013; Woodhead, Frost, and James, 2013; Antoninis, 2014; Soham 2017).

The rest of the paper is organized as follows. Section 2 presents background information on madrasahs and the mainstream education system in Indonesia. Section

3 discusses the methodology and the theoretical ideas underlying the empirical model of school choice. Section 4 discusses the data set while results are presented in Section 5. Section 6 concludes.

2. Study Context

With over some 340,000 educational institutions, Indonesia has the fourth largest education system in the world, behind the China, India and the United States (OECD/Asian Development Bank 2015). This is the outcome of sustained public investment in schooling infrastructure by past governments. The most notable is that construction of 60,000 primary schools in the 1970s (Dufflo, 2001). In 1984, the government also enacted a National Compulsory Education program requiring children to finish primary school. This program helped Indonesia achieve universal primary education by the late 1980s, involving different types of providers including Islamic schools.

The Islamic education in Indonesia comprises of two types of schools: Islamic general education and Islamic education. Both types of schools are divided according to the level of education. General education with Islamic characteristics consists of formal and non-formal schools. Regardless of their status, these schools use a modern system of education in which Islamic subjects are taught alongside general subjects as part of a national curriculum. The main aim of this type of school is to produce graduates like those from modern-style ‘non-religious’ schools but is distinguished by its having a better understanding of Islam. These schools are known as madrasahs. Around 70% of these madrasahs belong to private institutions^{vi} while the rest are managed by the government’s Ministry of Religious Affairs (MORA)^{vii}. In terms of structure, madrasahs follow the general school system and consist of kindegarten (raudhatul athfal or bustanul athfal), elementary level (Madrasah Ibtidaiyah or MI),

junior high school level (Madrasah Tsanawiyah or MTs) and senior high school level (Madrasah Aliyah or MA).^{viii}

On the other hand, exclusively Islamic focused education operates outside state purview consisting of *Madrasah Diniyah* and *Pondok Pesantren*, which teaches Islamic studies with an emphasis on classical Arabic books. Upon graduation, their students take up important positions within the community as *imams* of mosques and religious preachers (Hassan, 2009). Many pesantrens have boarding schools (or Pondok) attached to them. Pesantrens primarily teach Islamic education -- Quran and other (supporting) Islamic holy book, such as hadist, fiqh, ushul fiqh etc. Graduates of pesantren can continue their study to higher level at so-called *ma'had aly*, a higher education system that is specifically for pesantren graduates (Endang, 2003)

Islamic schooling system in the country was marginalized historically by the Dutch colonial administration and remained so in post-independence years by the Sukarno government. Following the collapse of Suharto regime in 1998, however, the number of madrasahs (including *pesantrens*) increased nationwide (OECD/Asian Development Bank 2015). In 2003, the government passed the new education law, which included a requirement that at least 20 per cent of the state budget is to be allocated for education. While this helped launch new programs to educational access and quality, it also provided further legitimacy to the country's madrasahs in two ways. First, it officially equalized the legal standing of Islamic education to that of conventional education. Second, it extended the same rights of access to government programs to Islamic education. Therefore madrasahs in Indonesia are no longer considered as a second-class choice (Makruf 2014).

Although roughly 90 per cent of Indonesian Islamic schools is privately operated, registered madrasahs still rely heavily on government support. The main

form of support for all schools is the School Operational Assistance scheme called Bantuan Operasional Sekolah (BOS). The program is jointly administered by the Ministry of National Education and the Ministry of Religious Affairs. The BOS funds are sufficient to cover the basic operating costs of madrasahs. However, compared to non-madrasah schools, the assistance received from local governments is smaller (Permani, 2011b). Published comparable administrative data on fees and tuition by school types are not readily available for Indonesia. Using IFLS 2007, however, Permani (2011b) provides some estimates of the cost of education by school type in Indonesia. Educational costs paid by the household per annum measured in terms of registration fees for non-madrasah education is twice that of madrasah education. When measured in terms of tuition fees, it is still statistically higher for non-madrasah education. Overall, madrasahs in Indonesia provide a cheaper alternative to non-madrasah schools (in terms of expenses on registration, tuition, examination fees, book, and uniforms) and rely on local communities for funding (Parker and Raihani, 2009).

Another attractive feature of the country's madrasah system is its gender inclusiveness. Compared to other Muslim countries where madrasahs were historically an all-boys institution, madrasahs in Indonesia have paved the way for women to study the Qur'an since the turn of the twentieth century. As early as in 1917, *Aisyiyah*, an affiliate of Muhammadiyah, Indonesia's oldest Islamic organization, was founded as the largest national organization for Muslim women. *Aisyiyah* runs a network of madrasahs offering preschool through university-level education which combines the study of the Qur'an with programs to preserve women's basic human rights as well as to train them as female religious leaders. Later in 1946, *Muslimat Nahdlatul Ulama* was founded which runs a similar network of madrasahs

where women can specialize in Islamic education. The products of these madrasahs include trained Qur'an reciters as well as female imams, intellectuals, and activists with expertise in Islamic studies and law. Many of these madrasahs are managed by women to ensure that knowledge of the Qur'anic texts is passed on to the next generation of women (van Doorn-Harder 2006).

Appendix Table 1 tabulates data on the total number of schools by levels of education and types of school in Indonesia for the period 2002/2003 – 2011/2012. In the year 2005/2006, 24% of the recognized schools reportedly belonged to the madrasah sector (58439 out of 244516). In addition to this, a total of 16015 pondok pesantren and about 34571 madrasah diniyah were identified. The number of both *Madrasah Diniyah* and *Pondok Pesantren* increased from 50,586 in the academic year 2005/2006 to 99,966 in the academic year 2011/2012. When recognized and unrecognized schools are combined, semi-formal and non-formal madrasahs accounted for 5.4% and 11.7% of the total number of schools in the country respectively. In total, therefore, unrecognized (i.e., non-formal) madrasahs (or Pesantren) accounted for 17.1% of all schools in Indonesia.^{ix} The share of recognized madrasahs in the total number of educational institutions varies at different levels of education. At the elementary level, madrasahs account for 13% of all schools in 2011/12 data. This rises to 31% and 36% at the junior and senior level respectively. The share of non-madrasah private schools also increases from elementary to senior level (OECD/Asian Development Bank 2015). This has implications for school type choice by households. Many of the poorer families would send their children only to primary or lower secondary school. The dominance of non-madrasah schools at the primary level implies that school type choice of economically poorer households in Indonesia is not necessarily supply-constrained.

Turning to administrative data on student enrolment in Appendix Table 1, in almost all types of schools, an equal number of girls are enrolled alongside boys. This is expected since gender gap in school enrolments have disappeared in Indonesia in recent years and in turn has contributed significantly to the rise in the overall enrolment rate, particularly in secondary education (Takahashi 2011; OECD/Asian Development Bank 2015). As a matter of fact, in two instances, girls outnumber boys. As per data for 2011-12, non-formal madrasahs had 2,257,708 girls against 2,071,433 boys. For the same time period, the total number of girls in senior madrasahs (private as well as public) was twice that of boys. The gender parity in madrasah enrolment in elementary and junior level and higher presence of girls in senior madrasahs highlight the role Islamic schools have played in educating girls in Indonesia.

Lastly, settlement size and livelihood vary across Indonesia's 17,000 islands. Seven provinces of Indonesia -- West Java, Central Java and Yogyakarta, East Java, West Sumatra, South Kalimantan, South Sulawesi, and West Nusa Tenggara -- collectively serve as the hub for Islamic education in Indonesia and have seen significant expansion of traditional, modern, and independent *madrasahs* (Jamhari and Jajat Burhanudi 2007). Historical legacy favored the growth of madrasah enrolment in Java and Sumatera as both were centers for the emergence and development of reformist madrasah and Islamic schools as well as traditional *pesantren* in the early 20th century. West Sumatra became a center for the Islamic reform movement by *Muhammadiyah* in the early part of the twentieth century. On the other hand, East Java was the center for prominent *Ulamas* in Indonesia who established traditional Islamic organization NU (Revival of the *Ulama*), in 1926. The NU is primarily an association of pesantren-based *Ulama* (also known as *kyais*) with a mass following (van Bruinessen 2008). South Sulawesi is home to educational

institutions affiliated with Islamic organizations other than *Muhammadiyah* and *NU* (Jamhari and Jajat Burhanudi 2007).^x Indonesia's geographic structure may cause spatial variation in the range of schools that households choose from for additional reasons. Numerous mountainous islands and fragmented geography often cause difficulties to recruit and train teachers therefore adversely affecting the supply of private and public schools (Postlethwaite and Thomas 1980). In many remote parts of the outer Islands, in particular, there is a severe shortage of qualified teachers -- some villages have school buildings but no teachers, or supplies (Kuipers 2011). This creates conditions for Islamic schools to thrive. A large-scale formal economic sector is lacking in Nusa Tenggara Timur, East Timor, Maluku and Sulawesi and Kalimantan so that cost-related considerations may favor madrasah enrolment in these regions. To cross-validate the spatial patterns of schools in Indonesia described in Jamhari and Jajat Burhanudi (2007), we use provincial data from published government reports on the stock of different types of schools. **Appendix Figures 1-3** present the data in maps. Consistent with popular perception, Java and Sumetara account for most madrasahs. At the same time, these two regions also have the highest concentration of public and private non-religious schools. In other words, province-level data confirms that madrasahs in Indonesia are not concentrated in areas where alternatives to madrasahs are short in supply.

In sum, the relative quality of private and public schools in Indonesia has not changed significantly over the past two decades. This is also true for recognized madrasahs, particularly in case of private (independent) madrasahs that do not receive funding from the government. Data on the physical conditions of buildings (a crude indicator of education quality) between 2004 and 2015 confirm that madrasahs are still in poor conditions. According to the data supplied by Bappenas and the Ministry

of Religious Affairs, the percentage of madrasah (and non-religious school) buildings damaged (heavy and medium) in 2004 was 27.3% at the junior-high level. In 2015, this figure was 37%. The access to education, especially for the poor in the rural areas, still remains a major challenge. At the same time, madrasahs in rural areas are perceived to be the best alternative for parents, especially those with reference for religious education.

3. Empirical framework for studying madrasah choice

Most of the studies on school choice in South and South-East Asian countries have examined the choice between public and private schools in terms of costs and quality factors (e.g., see Alderman, Orazem, and Paterno, 2001; Glick and Sahn, 2006; Newhouse and Beegle, 2006).^{xi} Newhouse and Beegle present a model to explain the household choice of a school type in Indonesia based on their wealth and preference for academic achievement. However, their theoretical model does not separately account for Islamic school enrolment.^{xii} However, research on the underlying rationale for madrasah education is rare. Two exceptions are Andrabi, Das, Khwaja, and Zajonc (2006) and Asadullah, Chakrabarti, and Chaudhury (2015). Andrabi et al. (2006) present descriptive evidence on the issue for Pakistan. The authors find that school choice by households in their data appears to be driven neither solely by poverty nor by the religious mindedness of households. On the basis of household censuses and surveys, it is shown that one household could send one of its children to a madrasah, another to a public school, and a third to one of the increasingly common private schools. Nonetheless, households that choose madrasahs account for a very small proportion in the study sample which limits the scope for a formal statistical analysis of the issue.

On the other hand, Asadullah, Chakrabarti, and Chaudhury (2015) use a richer dataset to investigate the issue in Bangladesh where a larger proportion of children attend madrasahs. The authors find that madrasah enrolment is higher in households that are poorer, more religious and located further from non-religious schools. However the relative quality of non-madrasah school is found to exert no influence, perhaps because of the small difference in quality. Asadullah et al. also develop a simple two-period framework to explain how a household chooses the proportion of

children to send to each school type. The model treats children as a source of old age transfers where the amount of transfers is determined by the labour market outcome of the children as well as their religious values^{xiii}. The latter is in turn influenced by their parents' religiosity as well as their schooling. Parents also derive satisfaction from sending a proportion of their children to madrasahs in a way that reflects their own religious values. Keeping in mind that children who are madrasah graduates are likely to earn less as adults, parents need to balance the economic motives of educating children with non-economic motives of school choice which are driven by their personal beliefs. The model then examines how factors such as household income, religious preferences, schooling costs and school quality affect the proportion of household children educated in each school type. A number of predictions follow from the model. Madrasah enrolment is predicted to be higher in households that are poorer, more religious and located further from non-religious schools.^{xiv}

In this study, we follow Asadullah et al. and specify a reduced form model of school choice where households decide on the child's school type (i.e. madrasah, private non-religious or government non-religious school)^{xv} as a function of household characteristics such as income (proxied by per capita household expenditure), parental education, household location as well as community characteristics (such as the availability of schools, presence of financial institutions and so on).^{xvi} The school choice equation is estimated as a multinomial regression model pooling data on children aged 5-18 years.^{xvii} To capture within household variation in school choice, we additionally control for child age, gender and birth order.^{xviii} Since school type choice may vary across primary, junior and secondary school age groups, we follow Pradhan (1998) and specify child age using a series of dummy variables. We do not restrict analysis by levels of schooling as many

unregistered madrasahs do not have a uniform grade structure. Moreover, our data set do not report school type separately for each level of education. Our regression model also controls for location dummies since the supply of and demand for Islamic schools vary across regions given the early influence of Islam in specific provinces and Indonesia's fragmented archipelagic geography.

Lastly, in some countries, the poor quality of non-religious education has been found to reduce demand for mainstream non-madrasah school attendance (Antoninis 2014) or have no impact on madrasah enrolment (Asadullah et al., 2015). If true, our analysis of school choice needs to account for the relative quality of alternatives to madrasahs. Our data set also does not have information on school quality. Therefore this is left out of the empirical analysis.

4. Data source and description

We use data from the 2005 round of the Indonesian Socio-economics Survey, SUSENAS, conducted by Indonesia's Central Statistical Bureau (BPS). SUSENAS, has national coverage and contains information on enrolment in different types of registered schools. In the 2005 round, interviewed in 93% of the sampled households were successful. The unsuccessful cases are mostly from the eastern part of Indonesia, where the number of madrasahs enrolled population is very small. SUSENAS doesn't separately enquire about enrolment in Pesentrans as education in this form of Islamic school is not recognized by the state. Enrolment data in SUSENAS only limits to formal education. Moreover, the distinction between madrasah and traditional Pesentren education is often unclear in Indonesia given that many students simultaneously attend state recognized madrasahs as well as Pesentren (Postlethwaite and Thomas 1980). Therefore in this paper, we do not differentiate between a child who is enrolled in a madrasah or Pesentran^{xix}. ,In addition, SUSENAS has no supply

side information. Therefore we rely on an additional data set --Village Potential Survey or Potensi Desa (PODES). The latter contains detailed data on community characteristics. Therefore the combined SUSENAS-PODES data set is used to study school choice

PODES is a socio-economic survey to estimate sectoral and regional development at village level or *kelurahan* (one level below the sub-district level). It started in 1980 and since then is being repeated every three-year by Central Statistical Bureau (Badan Pusat Statistik) to gather detailed information on village level infrastructures for 65,000 villages. PODES is usually conducted in parallel with the national census, with a focus on the economic potential of the villages. SUSENAS and PODES share the same enumeration code which makes it easy to merge them for joint statistical analysis at the sub-district level.

SUSENAS 2005 contains information on basic socio-economic information of 257,906 households or 1,052,091 individuals. For our analysis, we focus on 164,825 households which have at least one 5-18 years old child of the household head. For some sample villages, PODES data did not match with SUSENAS records.^{xx} After ignoring these cases, our final sample comprises of 151,241 households. Since we are interested in school choice amongst currently enrolled children, we further dropped households where none of the children is currently in school, but do not enrol to any college. This led to the final sample of 127,742 households containing information on 190,658 currently enrolled children aged 5-18 years.

Two patterns follow from **Appendix Table 2** which presents the summary statistics. First, the majority (82%) of the children are in public non-religious schools. Private non-madrasah schools and madrasahs account for 11%, and 3.8% of children are enrolled. Public and private combined, registered madrasahs account for 6% of all

enrolled children. Second, madrasah enrolment is higher in rural areas (7% vs. 4.6%) while private non-madrasah schools enjoy the largest enrolment share (17%) in urban areas.

SUSENAS does not provide information on reasons for school type choice by households – there is no question asking parents about why they send children to a given school type. This could be owing to household-specific factors such as poverty, general preference for human capital (as proxied by parental education) and location of the households (in terms of distance to educational facilities). Any systematic analysis of these factors must fully account for within household variation in enrolment. Households opting for madrasah education may have children of certain demographic backgrounds in terms of age and gender. We examine this formally in the next section in a multiple regression frameworks.

5. Results

Estimates of multinomial regression models of school choice are reported in **Table 1**. Public school is the base category so that each regression reports the determinants of the probability of enrolment in madrasah and private school enrolment relative to public schools. The summary statistics of the variables included in the model are presented in **Appendix Table 2**.

Unlike coefficient from the ordinary least squares regression model are readily interpretable as the predicted change in the dependant variable due to a unit change in the independent variable, the multinomial logit coefficients lack such ready interpretation and can only be interpreted in terms of relative probabilities. One needs to calculate marginal effects in order to reach conclusions about actual probabilities (Wooldridge 2010). Therefore, the estimated coefficients are reported in the form of

average marginal effects (AMEs) on the probability of attending madrasah and private vis-à-vis public non-religious schools.^{xxi}

Starting with individual specific correlates, child age and gender are two key demographic predictors of madrasah attendance in our regression models. Boys are favoured when it comes to private school enrolment (over public non-religious schools) whereas girls are more likely to enrol in madrasahs. An Indonesian girl is less likely to be sent to private non-religious schools holding other factors constant. The average marginal effect of being a girl on private enrolment is negative and eight percentage points lower than for boys with similar family backgrounds. This finding is similar to the evidence for Nigeria where being a male child increases the probability of attending non-madrasah school by 12 percentage points (Antoninis, 2014). Madrasah choice also differs from private non-religious school choice when it comes to child age. Private school attendance is significant and positive for children aged 13 years and over, with the probability being very large around the age of 17. On the other hand, madrasah school attendance is significant for children aged over 12 years, with the probability being very large around the age of 16.^{xxii}

[Table 1 about here]

Turning to household-specific factors, the most common of all factors is household income which is negatively (positively) correlated with the probability of madrasah (private non-religious school) enrolment. In both cases, the correlation is statistically significant confirming that children from poor households in Indonesia are more likely to attend madrasahs. However, almost half of this correlation is explained by parental background, i.e., whether parents are literate and/or have completed some schooling.^{xxiii} Irrespective of the parental background variable used, children with better parental background are systematically less likely to enrol in madrasah. On the

other hand, better parental background (e.g., father and mother being literate and/or completed some schooling) leads to a higher probability of enrolment in non-religious private school.^{xxiv} The regression model also includes controls for community development (proxied by “informal microfinance” and “cooperative for saving and loan”) and overall supply of schools (proxied by “distance to elementary schools”, “# of junior schools in district”, “# of senior schools in district”). Children in better-developed communities (i.e., those with a cooperative for saving and loan”) systematically have a smaller probability of enrolment in madrasah.^{xxv}

We also separately estimated a parsimonious model without control for school availability (results not shown). Comparison with the parsimonious model estimate shows that extra controls for school supply neither washed away the impact of household expenditure nor other previously included household and individual-specific correlates of school choice. The influence of community development also remains significant implying that the two proxies for village financial development were not capturing the omitted effect of school availability in the community. However, the coefficient on the number of non-religious schools is positive and significant implying that districts in Indonesia that are well-endowed in terms of supply of schools also have significantly higher enrolment in registered madrasahs. This result contrasts the evidence from other Muslim countries with similar educational and cultural settings where children are likely to enrol in madrasahs in areas with insufficient provision of non-madrasa schools (Asadullah, Chaudhury and Dar, 2007; Antoninis, 2014). **Table 1** also confirms the significance of locational factors in determining school choice in Indonesia. Households in rural localities are systematically more likely to send children to madrasahs while the opposite is true for those in urban areas. While this is consistent with the fact that most of the poor in

Indonesia are located in rural areas, it's somewhat surprising given that the regression models T thealready control for household income. The influence of rural location, net of income effect, it likely to capture unmeasured parental preference for religious education.

In order to further examine regional variation in the determinants of madrasah enrolment, **Table 1** additionally report estimates for rural and urban households. , theIrrespective of location, children from richer households are systematically less represented in madrasa; the marginal effect of household income is negative in both rural and urban sample. This combined with the earlier finding of higher madrasah enrolment in rural locations confirms that madrasahs in Indonesia draw significantly more children from the poorest of the poor, i.e., low-income households living in rural areas.

A number of correlates vary across the rural and urban population. First, controlling for parental background and location characteristics reduces the marginal effect of household income from -0.45 to -0.20. This confirms that madrasah going children from low-income households in urban locations are also from relatively less educated parents and disadvantaged neighborhoods within the urban sample.

Second, girls are significantly more likely to attend madrasah in urban areas. Motives for lower enrolment of girls in private schools and higher enrolment in madrasahs, particularly in urban locations are unclear. It could be that parents favour boys over girls by sending the latter to low-cost madrasahs either because of higher opportunity costs or lower returns to education for girls than for boys or both. There is emerging evidence for other low-income countries that find that parents allocate limited resources to the education of boys rather than girls irrespective of household income levels and school expenditures on girls tend to be lower than those for boys,

especially in private schools (see for example Filmer and Pritchett 1999).^{xxvi} However, studies on intra-household allocation of educational expenditure are limited on Indonesia. The available evidence does not suggest that Indonesian households spend less on daughters' education and health than sons (Quisumbing and Maluccio 2003).^{xxvii} This is also consistent with the fact that the effect of school type on test score in Indonesia does not vary by student gender (Newhouse and Beegle 2003) or Suryadarma (2015).

Since provinces in Indonesia differ significantly in terms of the extent of urbanization, economic development, geography, and ethnicity, we further disaggregate our results to better understand the importance of rural-urban divide in school choice. **Table 2** reports estimates of regression models separately for Java (the largest province) and off-Java Islands. Since Java is divided into four provinces (West Java, Central Java, East Java and Banten) and two special regions (DKI Jakarta and Jogjakarta), we include location dummies (where Banten as the comparator region). Similarly, we include locational dummies for the islands of Sumatra, West Nusa Tenggara, East Nusa Tenggara, Kalimantan, Sulawesi and Maluku Island (leaving Papua as the base category) in the latter regression. Additional estimates separating rural and urban households are presented in **Table 3**.

Surprisingly, household income has no predictive power in Java when it comes to madrasah enrolment (although private school enrolment is still significantly and positively associated with income). The marginal effect of income variable on madrasah enrolment is also closer to zero (compared to estimates reported in **Table 1**). This implies that madrasahs in Java attract students from all income groups. On the other hand, child gender continues to exert a strong influence: girls in Java are

more likely to be in madrasah, particularly in urban areas while the boys have a higher probability of enrolment in private schools in the urban area.

[Table 2 about here]

[Table 3 about here]

Turning to regional patterns in **Table 2**, the location dummies on central and east Java show statistically significant association with madrasa enrolment. In off-Java sample, all locations indicate a higher likelihood of madrasa enrolment vis-à-vis the province of Papua. These findings are consistent with the way historical past of Indonesia. Islam spread from Sumatera and Java to other to other parts of Indonesia, particularly the islands of Ambon, Ternate, Lombok (West Nusa Tenggara), and Sulawesi. This saw significant growth of Islamic schools in these locations. On the other hand, Islam rarely spread to Papua, East Nusa Tenggara, and other off-Java locations that have strong influences from Portuguese or Dutch. Therefore, children living in several parts of Java (such as central and east) and off-Java provinces of West Nusa Tenggara and Maluku have a strong likelihood of madrasa attendance. Lastly, separation of rural and urban households (**Table 3**) reveals that only in the province of East Java children are more likely to be in madrasa irrespective of rural or urban location.

In sum, our analysis confirms the importance of both within as well as between household factors in determining children's school choice in Indonesia. The importance of common household level factors is highlighted by the persistent effect of household income as a predictor of school choice in Indonesia. At the same time, we find a systematic link between madrasa enrolment and a child-specific attribute, i.e., gender. Girls are significantly more likely to be enrolled in madrasah whereas boys send to private schools. Although this pattern prevails in all samples, rural,

urban, and the province of Java, this does not necessarily imply that Indonesian parents discriminate against daughters by sending them to madrasahs. To the contrary, available evidence indicates that household expenditure decisions in Indonesia appear to be characterized by egalitarian cultural values. We further investigated the issue of the relative importance of between and within household factors in predicting school choice in Indonesia by including an additional indicator that varies at the sibling level within the household, namely birth order of the child. The eldest child is less likely to be enrolled in madrasah while no such across-sibling variation is observed in case of private school enrolment.^{xxviii} Sub-sample analysis of the data reveals that this result is specific to urban households (Table 1). Region-wise estimates of regression model further show that this result arises in non-Java provinces (Table 2) and that too among urban households (Table 3).

6. Study limitations

Our analysis is subject a number of data related limitations. First, Pesaenten enrolment (i.e., *Madrasah Diniyah* and *Pondok Pesantren*) is not recorded in the data set used -- SUSENAS questionnaire only asked about enrollment in the formal education system and for children who were residing in the household at the time of the survey. A large number of Pesantrens are residential, requiring students to be full-time where boarding facilities are provided. SUSENAS exclude these students as they don't co-reside with parents in the household. In case of non-residential Pesantrens, student enroll on a part-time basis and additionally attend formal school/madrasah. Therefore, we only study household decisions to choose among different types of formal schools. Second, our empirical analysis does not account for religious preference since SUSENAS has no information on parental religious preference as well as the religious identity of the household. A recent theoretical paper on Islamic

school choice, Asadullah et al. 2015, models madrasah choice as a function of children's filial piety and religiosity. To the extent such demands are greater among poorer parents, the omission of religious preferences is going to overstate the true (negative) effect of parental income on madrasah enrolment. Similarly, there are a number of reasons for which parents may prefer madrasahs for daughters. While we have outlined some of the potential channels underlying girls' enrolment decisions in madrasahs, we could not formally test them because of the unavailability of data on marriage outcomes. These hypotheses are left out for future research.

7. Conclusion

To the best of our knowledge, this is the first paper on school choice in Indonesia that systematically compares and contrasts the determinants of recognized madrasah attendance with that of non-religious schools. Our results suggest that madrasah enrolment decisions in Indonesia are explained largely in terms of socio-economic factors – more literate, urban, richer and better-educated parents choose private and public non-religious schools over recognized Islamic schools. The combined effects of location and income imply that madrasahs attract the very poor implying that recognized madrasa choice in Indonesia is primarily an economic phenomenon. These findings are consistent with emerging international evidence on the correlates of madrasah enrolment in other Muslim countries (Antoninis, 2014; Asadullah and Chaudhury 2016; Goensch, 2016). Moreover, we find strong evidence of gender difference in school choice decisions even though there is no gender gap in overall enrolment statistics in Indonesia. Irrespective of the household's location (Java vs. non-Java; rural vs. urban), girls are significantly more likely to be sent to madrasahs.

The finding of gender difference in school type choice in Indonesia is apparently in line with growing international evidence that expanded school choice and the rise of private schools heightens gender inequalities as parents choose what they consider high-cost schooling options for sons, leaving daughters in under-resourced schools (Srivastava, 2006; Azam and Kingdon, 2013; Woodhead, Frost, and James, 2013; Soham 2017). However, our review of the existing evidence on intra-household allocation of expenditure does not suggest that Indonesian parents systematically gender discriminate by spending more on sons. The answer to this puzzle may lie in the fact that non-economic motives dominate school type choice for girls or female madrasah enrolment decisions. In the past few decades, a network of Salafi madrasahs has emerged which impose conservative dress codes such as *niqab* (a form of enveloping black veil) which would be appealing to conservative parents in rural areas (Hasan 2008). The relatively higher presence of girls in madrasahs may therefore in part reflect the growing influence of Salafi ideology in the country.

In addition to examining the above possibilities, follow up research can build on our findings in a number of additional ways. First, large-scale enrolment of girls in madrasahs may lead to reproduction of conservative gender norms in the society and undermine efforts to empower women. Women in Muslim countries are under-represented in the labor market and lacks a voice in household decision making (Groh and Rothschild 2012). Madrasah attendance may reinforce this pattern by undermining female agency in and outside family life. Therefore research on the labor market choice and within marriage status of madrasah educated women in Indonesia can be informative. Second, evidence for other developing countries suggests some possibilities that can be examined in Indonesian context to understand the motives for madrasa enrolment. For Pakistan, the share of teachers residing in the community was

found to have a particularly important effect on girls' enrolment (Lloyd et al. 2005). If madrasahs in Indonesia also rely on locally recruited teachers, they may enjoy a similar advantage over private and public non-religious schools in attracting girls. The second possibility is that private schools may have expanded more in richer areas and communities in which gender inequality in enrolment is absent.^{xxix} The opposite may be true for madrasahs. If true, our analysis may have picked up community or village level differences in the relative supply of madrasahs and private non-religious schools. Research on these questions would help policy makers understand how best to engage with Islamic faith schools for educational development in Indonesia and other Muslim countries.

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Table 1: Multinomial logit estimates of determinants of school choice in Indonesia

	(Pooled)		(Rural)		(Urban)	
	Islamic	Private	Islamic	Private	Islamic	Private
Child characteristics						
Age 7	-0.237** (2.96)	-0.274*** (5.49)	-0.299** (3.04)	-0.309*** (3.96)	-0.09 (0.65)	-0.233*** (3.61)
Age 8	-0.104 (1.36)	-0.319*** (6.51)	-0.147 (1.60)	-0.259*** (3.51)	0.005 (0.04)	-0.373*** (5.76)
Age 9	-0.077 (1.01)	-0.378*** (7.68)	-0.16 (1.70)	-0.318*** (4.24)	0.118 (0.91)	-0.411*** (6.35)
Age 10	-0.098 (1.304)	-0.307*** (6.26)	-0.136 (1.47)	-0.228** (3.02)	0.001 (0.00)	-0.376*** (5.90)
Age 11	-0.036 (0.473)	-0.382*** (7.54)	-0.081 (0.88)	-0.315*** (4.09)	0.076 (0.56)	-0.421*** (6.28)
Age 12	0.256*** (3.434)	-0.194*** (4.013)	0.243** (2.66)	-0.219** (2.89)	0.302* (2.31)	-0.167** (2.67)
Age 13	0.840*** (11.47)	0.239*** (4.78)	0.836*** (9.32)	0.316*** (4.06)	0.856*** (6.75)	0.198** (3.02)
Age 14	1.144*** (15.20)	0.465*** (9.21)	1.216*** (13.14)	0.530*** (6.63)	0.967*** (7.47)	0.424*** (6.50)
Age 15	1.177*** (15.73)	0.652*** (12.89)	1.230*** (13.44)	0.752*** (9.48)	1.059*** (8.11)	0.603*** (9.17)
Age 16	1.225*** (15.72)	1.010*** (19.80)	1.296*** (13.36)	1.167*** (14.25)	1.076*** (8.28)	0.917*** (14.03)
Age 17	1.115*** (13.81)	1.271*** (24.89)	1.250*** (12.52)	1.494*** (18.17)	0.856*** (6.23)	1.134*** (17.43)
Age 18	1.053*** (12.38)	1.215*** (22.13)	1.176*** (11.17)	1.540*** (17.69)	0.838*** (5.82)	1.009*** (14.38)
Girl (dummy)	0.110*** (5.48)	-0.080*** (5.17)	0.096*** (4.08)	-0.049* (2.11)	0.147*** (3.86)	-0.101*** (4.90)
Child birth order	-0.037** (2.69)	0.012 (1.13)	-0.022 (1.30)	0.001 (0.08)	-0.062* (2.52)	0.02 (1.44)
Household characteristics						
Number of children (0-18 yo)	0.026* (2.33)	0.048*** (4.94)	0.024 (1.74)	0.005 (0.36)	0.033 (1.64)	0.062*** (4.81)
Household per capita expenditure	-0.200*** (5.57)	0.311*** (9.46)	-0.190*** (3.98)	-0.078 (1.50)	-0.209*** (3.86)	0.586*** (14.60)
Mother can read	-0.313*** (9.16)	0.171*** (5.62)	-0.315*** (7.51)	0.185*** (4.239)	-0.284*** (4.81)	0.159*** (3.74)
Father can read	-0.306*** (9.27)	0.149*** (5.29)	-0.323*** (7.93)	0.122** (2.99)	-0.260*** (4.66)	0.168*** (4.38)
Mother education (Elementary)	0.037 (0.96)	-0.086** (2.67)	0.028 (0.63)	-0.069 (1.56)	0.047 (0.65)	-0.094* (1.97)
Mother education (Junior HS)	-0.041 (0.78)	-0.06 (1.50)	-0.029 (0.45)	0.026 (0.44)	-0.081 (0.91)	-0.125* (2.29)
Mother education (Senior HS)	-0.269*** (4.21)	0.02 (0.45)	-0.239** (2.83)	0.139 (1.94)	-0.272** (2.72)	-0.088 (1.50)
Mother Education (Diploma)	-0.248* (2.27)	-0.113 (1.59)	-0.216 (1.38)	-0.143 (0.98)	-0.235 (1.52)	-0.246** (2.87)
Mother Education (Bachelor and higher)	-0.456** (3.20)	0.233** (3.00)	-0.072 (0.33)	0.695*** (3.36)	-0.528** (2.71)	-0.016 (0.18)
Father education (Elementary)	-0.045 (1.20)	-0.081* (2.52)	-0.06 (1.38)	-0.056 (1.34)	-0.007 (0.09)	-0.052 (1.01)
Father education (Junior HS)	-0.231*** (4.75)	-0.053 (1.35)	-0.221*** (3.71)	-0.014 (0.25)	-0.259** (3.04)	-0.041 (0.71)
Father education (Senior HS)	-0.325*** (5.71)	-0.106* (2.53)	-0.203** (2.84)	-0.049 (0.75)	-0.493*** (5.21)	-0.1 (1.71)
Father Education (Diploma)	-0.218* (2.06)	-0.310*** (4.27)	0.005 (0.03)	-0.259* (1.97)	-0.583*** (3.64)	-0.324*** (3.57)
Father Education (Bachelor and higher)	-0.095 (0.93)	-0.174** (2.61)	0.053 (0.37)	-0.479** (3.11)	-0.257 (1.70)	-0.157* (1.96)
Community characteristics						
Rural location	0.352*** (7.44)	-0.649*** (17.65)				

Informal Microfinance	-0.045*** (3.86)	-0.029** (2.59)	-0.052*** (3.47)	-0.005 (0.55)	-0.038 (1.72)	-0.051** (2.84)
Cooperative for saving and loan	-0.047*** (3.44)	-0.033* (2.56)	-0.043* (2.57)	0 (0.00)	-0.067** (2.62)	-0.047** (2.58)
Distance to Elementary	-0.003 (0.64)	0.007 (0.99)	-0.002 (0.52)	0.007 (0.88)	0.002 (0.02)	0.008 (0.11)
Number of Junior High Schools	0.048** (2.71)	0.028 (1.92)	0.046* (2.45)	0.018 (1.11)	0.087* (1.99)	0.042 (1.33)
Number of Senior High Schools	0.083*** (3.32)	-0.03 (1.27)	0.070** (2.61)	-0.028 (0.90)	0.1 (1.49)	0.001 (0.02)
Province dummies						
Sumatera	-0.876*** (17.20)	-0.286*** (7.05)	-0.948*** (14.69)	-0.326*** (5.47)	-0.777*** (9.99)	-0.157** (2.91)
West Nusa Tenggara	-0.261* (2.33)	-1.518*** (10.97)	-0.319* (2.25)	-1.246*** (6.93)	-0.182 (1.18)	-1.706*** (8.00)
Bali and East Nusa Tenggara	-1.331*** (8.81)	1.041*** (14.10)	-1.302*** (7.366)	1.482*** (17.66)	-1.293*** (5.391)	0.09 (0.797)
Kalimantan	-0.416*** (5.89)	-0.718*** (9.21)	-0.556*** (6.258)	-0.680*** (7.335)	-0.043 (0.395)	-0.646*** (5.437)
Sulawesi	-1.295*** (19.68)	-0.834*** (13.01)	-1.388*** (18.262)	-0.748*** (9.590)	-1.038*** (7.957)	-0.805*** (7.589)
Maluku	-1.419*** (9.87)	0.19 (1.55)	-1.464*** (8.694)	0.558*** (4.013)	-1.247*** (5.410)	-0.483* (1.990)
Papua	-2.555*** (10.72)	0.452** (3.15)	-2.678*** (10.317)	0.762*** (4.331)	-1.799** (3.034)	0.038 (0.166)
Constant	0.047 (0.10)	-5.657*** (13.73)	0.327 (0.562)	-1.814** (2.880)	0.037 (0.054)	-8.998*** (17.663)
Pseudo R ²		0.10		0.10		0.08
N		190658		117873		72785
Chi ²		8274.20		5027.622		3218.717

Note: (a) Only marginal effects are reported (b) Base outcome category is “public non-religious school enrolment”. (c) Omitted province is Java. (d) t-statistics in parenthesis (e) Omitted age-category is 5 and 6 year olds.

Table 2: Multinomial logit estimates of determinants of school choice – Java and non-Java provinces, full sample

	Java		Non-Java	
	Islamic	Private	Islamic	Private
Child characteristics				
Age 7	-0.209 (1.922)	-0.506*** (5.787)	-0.302* (2.493)	-0.172** (2.845)
Age 8	-0.12 (1.129)	-0.617*** (6.953)	-0.097 (0.861)	-0.196*** (3.374)
Age 9	-0.065 (0.629)	-0.691*** (7.555)	-0.105 (0.906)	-0.242*** (4.161)
Age 10	-0.108 (1.044)	-0.642*** (7.252)	-0.103 (0.922)	-0.170** (2.914)
Age 11	-0.065 (0.612)	-0.607*** (6.598)	-0.04 (0.356)	-0.270*** (4.435)
Age 12	0.127 (1.219)	-0.270** (3.203)	0.390*** (3.544)	-0.148* (2.502)
Age 13	0.563*** (5.422)	0.421*** (4.984)	1.093*** (10.212)	0.150* (2.393)
Age 14	0.822*** (7.706)	0.730*** (8.588)	1.423*** (12.843)	0.313*** (4.922)
Age 15	0.839*** (7.668)	1.037*** (12.342)	1.462*** (13.509)	0.426*** (6.601)
Age 16	1.006*** (8.908)	1.478*** (17.305)	1.428*** (12.55)	0.739*** (11.343)
Age 17	0.826*** (6.805)	1.802*** (20.933)	1.364*** (11.853)	0.943*** (14.318)
Age 18	0.823*** (6.349)	1.724*** (18.754)	1.260*** (10.465)	0.918*** (12.834)
Girl	0.118*** (3.918)	-0.147*** (5.634)	0.099*** (3.665)	-0.040* (2.043)
Child birth order	0.006 (0.26)	0.035 (1.845)	-0.049** (2.849)	-0.007 (0.587)
Household characteristics				
Number of children (0-18 yr)	0.145*** (7.44)	0.068*** (4.074)	0.016 (1.152)	0.030* (2.54)
Household per capita expenditure	-0.041 (0.735)	0.531*** (11.104)	-0.096* (2.027)	0.180*** (3.992)
Mother can read	-0.364*** (7.145)	0.117** (2.698)	-0.264*** (5.688)	0.185*** (4.385)
Father can read	-0.253*** (5.286)	0.116** (2.777)	-0.353*** (7.815)	0.166*** (4.376)
Mother education (Elementary)	0.067 (1.159)	-0.055 (1.127)	0.014 (0.27)	-0.093* (2.225)
Mother education (Junior HS)	0.027 (0.347)	-0.086 (1.385)	-0.144* (2.030)	-0.05 (0.994)
Mother education (Senior HS)	-0.378*** (3.625)	-0.1 (1.400)	-0.269*** (3.300)	0.075 (1.35)
Mother Education (Diploma)	-0.405* (2.163)	-0.360** (3.045)	-0.221 (1.657)	0.001 (0.013)
Mother Education (Bachelor and higher)	-0.919*** (3.747)	0.133 (1.119)	-0.231 (1.356)	0.212* (1.983)
Father education (Elementary)	-0.029 (0.520)	-0.078 (1.536)	-0.034 (0.666)	-0.078 (1.904)
Father education (Junior HS)	-0.199* (2.574)	-0.121 (1.899)	-0.242*** (3.828)	-0.031 (0.636)
Father education (Senior HS)	-0.352*** (3.839)	-0.118 (1.744)	-0.294*** (4.056)	-0.101 (1.940)
Father Education (Diploma)	-0.227 (1.238)	-0.304** (2.624)	-0.196 (1.559)	-0.319*** (3.383)
Father Education (Bachelor and higher)	-0.164 (0.998)	-0.064 (0.606)	-0.105 (0.825)	-0.240** (2.750)
Community characteristics				

Rural location	0.427*** (5.856)	-0.710*** (14.139)	0.270*** (4.537)	-0.641*** (12.936)
Informal Microfinance	-0.080*** (3.348)	-0.008 (0.827)	-0.033 (1.958)	-0.046* (2.415)
Cooperative for saving and loan	-0.125** (2.664)	-0.012 (0.801)	-0.031* (2.216)	-0.041* (2.247)
Distance to Elementary	-0.534 (1.310)	0.124 (0.70)	-0.002 (0.524)	0.006 (0.867)
Number of Junior High Schools	0.245*** (5.904)	0.039 (1.046)	0.023 (1.559)	0.024 (1.715)
Number of Senior High Schools	0.256*** (4.623)	0.007 (0.133)	0.032 (1.239)	-0.028 (1.096)
Provinces				
DKI Jakarta	-0.064 (0.318)	0.279* (2.005)		
West Java	0.164 (1.079)	0.025 (0.218)		
Central Jateng	0.767*** (5.214)	0.145 (1.262)		
Jogjakarta	-0.519 (1.896)	0.766*** (5.054)		
East Java	0.998*** (6.938)	0.234* (2.026)		
Sumatera			1.615*** (6.783)	-0.699*** (5.035)
West Nusa Tenggara			2.246*** (8.693)	-1.928*** (10.058)
Bali and East Nusa Tenggara			1.187*** (4.301)	0.547*** (3.593)
Kalimantan			2.086*** (8.588)	-1.128*** (7.370)
Sulawesi			1.228*** (5.099)	-1.266*** (8.587)
Maluku Island			1.155*** (4.261)	-0.264 (1.488)
Constant	-2.809*** (3.901)	-8.689*** (13.767)	-3.645*** (5.698)	-3.536*** (6.018)
Pseudo R ²		0.13		0.09
N		58924		131734
Chi ²		5403.402		4191.445

Note: (a) Omitted provinces are Banten and Papua for Java and non-Java sample respectively. (b) Only marginal effects are reported (c) Base outcome category is “public non-religious school enrolment”. (d) Omitted province is Java. (e) Omitted age-category is 5 and 6 year olds.

Table 3: Multinomial logit estimates of determinants of school choice – Java and non-Java provinces, rural and urban sub-samples

	Java				Non-Java			
	Rural Islamic	Private	Urban Islamic	Private	Rural Islamic	Private	Urban Islamic	Private
Child characteristics								
Age 7	-0.192 (1.388)	-0.497* (2.136)	-0.206 (1.171)	-0.460*** (4.781)	-0.396** (2.803)	-0.263** (3.163)	0.004 (0.019)	-0.052 (0.610)
Age 8	-0.082 (0.613)	-0.753** (3.095)	-0.161 (0.920)	-0.549*** (5.641)	-0.181 (1.397)	-0.181* (2.326)	0.184 (0.836)	-0.232** (2.727)
Age 9	-0.11 (0.824)	-0.636** (2.695)	0.035 (0.214)	-0.655*** (6.442)	-0.179 (1.323)	-0.248** (3.118)	0.151 (0.668)	-0.218** (2.604)
Age 10	-0.066 (0.500)	-0.842*** (3.389)	-0.142 (0.856)	-0.567*** (5.855)	-0.17 (1.308)	-0.137 (1.721)	0.138 (0.637)	-0.220** (2.616)
Age 11	-0.075 (0.547)	-0.543* (2.324)	-0.015 (0.088)	-0.571*** (5.595)	-0.07 (0.538)	-0.249** (3.015)	0.071 (0.305)	-0.281** (3.157)
Age 12	0.199 (1.483)	-0.271 (1.190)	0.03 (0.178)	-0.218* (2.356)	0.323* (2.526)	-0.185* (2.266)	0.638** (2.992)	-0.104 (1.227)
Age 13	0.638*** (4.784)	0.831*** (3.851)	0.479** (2.886)	0.357*** (3.778)	1.034*** (8.25)	0.229** (2.695)	1.309*** (6.552)	0.067 (0.737)
Age 14	0.965*** (7.066)	1.287*** (6.006)	0.644*** (3.728)	0.597*** (6.267)	1.446*** (11.082)	0.353*** (3.983)	1.344*** (6.617)	0.279** (3.063)
Age 15	0.982*** (6.938)	1.632*** (7.708)	0.665*** (3.812)	0.885*** (9.358)	1.448*** (11.438)	0.526*** (5.919)	1.527*** (7.465)	0.348*** (3.75)
Age 16	1.206*** (8.089)	2.242*** (10.557)	0.815*** (4.662)	1.265*** (13.172)	1.447*** (10.71)	0.859*** (9.296)	1.402*** (6.894)	0.627*** (6.842)
Age 17	1.208*** (7.477)	2.792*** (13.103)	0.482* (2.547)	1.492*** (15.68)	1.415*** (10.424)	1.085*** (11.6)	1.255*** (5.906)	0.830*** (8.974)
Age 18	1.206*** (6.886)	2.799*** (12.705)	0.510** (2.592)	1.394*** (13.619)	1.306*** (9.22)	1.182*** (11.811)	1.182*** (5.276)	0.688*** (6.856)
Girl	0.102** (2.728)	-0.099 (1.933)	0.148** (2.893)	-0.157*** (5.196)	0.090** (2.944)	-0.03 (1.143)	0.130* (2.249)	-0.045 (1.568)
Child birth order	0.016 (0.516)	-0.003 (0.073)	-0.015 (0.414)	0.048* (2.22)	-0.035 (1.790)	-0.004 (0.217)	-0.090** (2.632)	-0.006 (0.346)
Household characteristics								
Number of children (0-18 yr)	0.144*** (5.734)	0.073* (2.553)	0.145*** (4.629)	0.063** (3.158)	0.011 (0.693)	-0.002 (0.144)	0.026 (0.979)	0.055** (3.19)
Household per capita expenditure	-0.087 (1.083)	0.233** (2.927)	-0.026 (0.345)	0.581*** (10.319)	-0.112 (1.899)	-0.127* (2.088)	-0.064 (0.853)	0.587*** (9.502)
Mother can read	-0.389*** (5.871)	-0.096 (1.412)	-0.332*** (4.163)	0.205*** (3.727)	-0.293*** (5.394)	0.275*** (4.965)	-0.168 (1.922)	0.094 (1.441)
Father can read	-0.230*** (3.641)	0.092 (1.314)	-0.287*** (3.935)	0.096 (1.867)	-0.380*** (7.219)	0.121* (2.457)	-0.270** (3.071)	0.247*** (4.26)
Mother education (Elementary)	0.067 (0.915)	-0.008 (0.108)	0.074 (0.775)	-0.069 (1.090)	0.017 (0.305)	-0.095 (1.823)	0.019 (0.179)	-0.105 (1.459)
Mother education (Junior HS)	0.065 (0.629)	-0.046 (0.398)	-0.03 (0.257)	-0.118 (1.566)	-0.125 (1.496)	0.01 (0.155)	-0.205 (1.533)	-0.12 (1.505)
Mother education (Senior HS)	-0.232 (1.529)	-0.093 (0.559)	-0.434** (2.946)	-0.151 (1.805)	-0.292** (2.825)	0.147 (1.859)	-0.239 (1.740)	-0.054 (0.655)
Mother Education (Diploma)	-0.186 (0.619)	-0.216 (0.703)	-0.498* (2.079)	-0.412** (3.227)	-0.252 (1.401)	-0.177 (1.082)	-0.149 (0.750)	-0.125 (1.073)
Mother Education (Bachelor and higher)	-0.336 (0.889)	0.721 (1.705)	-1.078*** (3.294)	0.023 (0.18)	0.001 (0.002)	0.648** (2.678)	-0.271 (1.159)	-0.098 (0.774)
Father education (Elementary)	-0.073 (1.076)	-0.079 (1.070)	0.026 (0.268)	-0.062 (0.877)	-0.018 (0.324)	-0.055 (1.092)	-0.069 (0.604)	-0.021 (0.285)
Father education (Junior HS)	-0.069 (0.683)	-0.044 (0.392)	-0.389*** (3.318)	-0.126 (1.570)	-0.292*** (3.961)	-0.012 (0.185)	-0.106 (0.854)	0.048 (0.585)
Father education (Senior HS)	-0.171 (1.343)	-0.151 (1.087)	-0.543*** (4.151)	-0.104 (1.253)	-0.208* (2.411)	-0.044 (0.611)	-0.446** (3.198)	-0.075 (0.910)
Father Education (Diploma)	-0.022 (0.083)	-1.044*** (3.344)	-0.599* (2.555)	-0.213 (1.653)	-0.022 (0.145)	-0.132 (0.934)	-0.537* (2.435)	-0.379** (2.896)
Father Education (Bachelor and higher)	-0.168 (0.686)	-0.632* (2.021)	-0.268 (1.165)	-0.032 (0.278)	0.123 (0.698)	-0.458** (2.606)	-0.34 (1.713)	-0.2 (1.789)

Community characteristics								
Informal Microfinance	-0.072**	-0.006	-0.096*	-0.019	-0.038	-0.013	-0.024	-0.079**
	(2.628)	(0.629)	(2.541)	(0.970)	(1.927)	(0.773)	(0.706)	(2.734)
Cooperative for saving and loan	0.09	0.001	-0.151**	-0.015	-0.034	0	-0.034	-0.076*
	(1.314)	(0.032)	(2.979)	(0.838)	(1.913)	(0.000)	(1.253)	(2.372)
Distance to Elementary	-1.912	0.132	-0.135	0.021	-0.002	0.006	-0.035	0.019
	(1.783)	(0.815)	(0.305)	(0.059)	(0.487)	(0.833)	(0.416)	(0.286)
Number of Junior High Schools	0.290***	0.06	0.149*	0.037	0.021	0.019	0.065	0.041
	(5.445)	(1.178)	(2.235)	(0.723)	(1.362)	(1.179)	(1.403)	(1.097)
Number of Senior High Schools	0.380***	0.270**	0.253***	-0.037	0.039	-0.03	-0.016	0.015
	(3.774)	(2.655)	(3.5)	(0.595)	(1.314)	(0.981)	(0.274)	(0.335)
Provinces								
DKI Jakarta			-0.449	-0.019				
			(1.829)	(0.127)				
West Java	0.468*	0.729***	-0.279	-0.178				
	(2.314)	(3.517)	(1.251)	(1.324)				
Central Jateng	1.070***	1.177***	0.325	-0.199				
	(5.515)	(6.042)	(1.455)	(1.448)				
Jogjakarta	-0.545	1.555***	-0.468	0.559**				
	(1.297)	(5.82)	(1.419)	(3.074)				
East Java	1.294***	1.178***	0.567*	-0.05				
	(6.848)	(6.005)	(2.553)	(0.364)				
Sumatera					1.699***	-1.048***	1.107	-0.169
					(6.566)	(6.006)	(1.864)	(0.771)
West Nusa Tenggara					2.334***	-1.965***	1.738**	-1.660***
					(8.121)	(8.138)	(2.848)	(5.506)
Bali and East Nusa Tenggara					1.341***	0.665***	0.56	0.099
					(4.391)	(3.605)	(0.88)	(0.413)
Kalimantan					2.102***	-1.419***	1.806**	-0.643**
					(7.89)	(7.505)	(3.012)	(2.649)
Sulawesi					1.278***	-1.491***	0.847	-0.768**
					(4.878)	(8.270)	(1.408)	(3.239)
Maluku Island					1.234***	-0.202	0.74	-0.465
					(4.118)	(0.968)	(1.179)	(1.458)
Constant	-2.282*	-7.085***	-2.305*	-8.983***	-3.213***	-0.408	-3.746***	-8.958***
	(2.305)	(7.005)	(2.301)	(12.008)	(4.177)	(0.534)	(3.306)	(10.862)
Pseudo R ²		0.13		0.10		0.10		0.06
N		27312		31612		90561		41173
Chi ²		2283.696		2449.307		2991.576		1344.661

Note: (a) Omitted provinces are Banten and Papua for Java and non-Java sample respectively. (b) Only marginal effects are reported (c) Base outcome category is “public non-religious school enrolment”. (d) Omitted province is Java. (e) Omitted age-category is 5 and 6 year olds.

Appendix Table 1: Breakdown of students and schools by religious orientation and educational levels, 2003-2012

		# of schools			# of students					
		2002/3	2005/6	2011/2012	2002/3		2005/6		2011/2012	
					Male	Female	Male	Female	Male	Female
Registered Elementary	School: Public	132,970	136,302	133,597	12,382,986	11,675,462	12,434,423	11,607,157	12,884,585	12,152,051
	: Private	10,123	10,580	13,229	960,193	900,257	1,008,209	932,801	1,326,237	1,221,046
	Madrasah: Public	1,483	1,568	1,686	154,215	148,596			210,150	202,427
	: Private	21,612	21,042	21,385	1,416,448	1,412,677			1,433,970	1,353,912
Junior	School: Public	10,953	12,951	20,594	2,786,383	2,731,244	2,948,424	2,963,956	3,622,623	3,549,778
	: Private	8,913	10,902	13,074	985,023	944,620	1,122,436	1,038,573	1,171,730	1,081,205
	Madrasah: Public	1,168	1,264	1,437	240,762	267,759			318,527	332,917
	: Private	10,236	11,234	13,807	767,782	790,444			1,011,693	1,081,885
Senior	School : Public	3,120	3,940	5,570	879,291	947,755	955,737	1,113,506	1,267,943	1,559,574
	: Private	4,916	5,377	6,084	719,442	597,242	743,625	684,552	675,524	693,426
	Madrasah: Public	575	642	758	120,374	171,234			134,972	219,768
	: Private	3,428	4,276	5,906	196,606	210,090			278,247	426,827
Unregistered madrasahs										
	Semi-formal	14,067	16,015	27,230			1,696,494	1,493,900	1,886,748	1,872,450
	Non-formal	10,929	34,571	72,736			1,685,550	1,792,829	2,071,433	2,257,708

Notes: (a) Data is from Ministry of Religious Affairs (2012). (b) Since Pesantren or unrecognized madrasahs do not have a uniform grade structure, data on these madrasahs are not organized by the level of education (e.g. primary or secondary). (c) We don't account for enrolment in vocational stream at the senior secondary level.

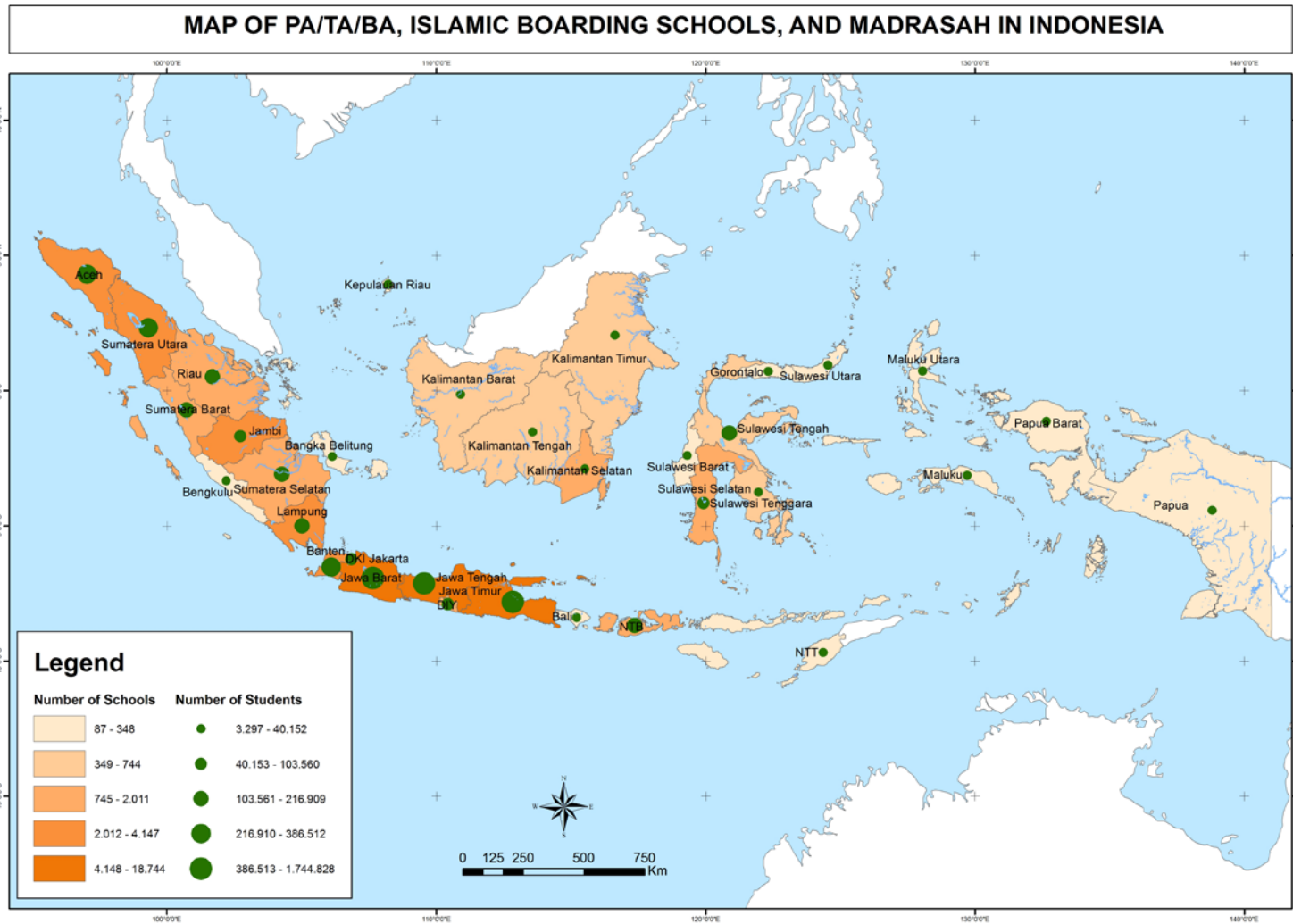
Appendix Table 2: Summary Statistics

	Pooled		Rural		Urban	
	mean	std. dev.	mean	std. dev.	mean	std. dev.
School enrolment status by institution type						
Madrasah enrolment						
Public	0.02	0.15	0.03	0.16	0.02	0.14
Private	0.04	0.19	0.04	0.21	0.03	0.16
(Private + Public)	(0.06)	(0.24)	(0.07)	(0.26)	(0.05)	(0.21)
Non-madrasah school enrolment						
Private	0.12	0.32	0.08	0.27	0.17	0.38
Public	0.82	0.38	0.85	0.36	0.78	0.41
Child characteristics						
Child' age						
year 7	0.09	0.29	0.09	0.29	0.09	0.28
year 8	0.10	0.29	0.10	0.30	0.09	0.29
year 9	0.10	0.30	0.10	0.30	0.09	0.29
year 10	0.11	0.31	0.11	0.31	0.10	0.30
year 11	0.09	0.29	0.09	0.29	0.09	0.28
year 12	0.10	0.30	0.11	0.31	0.09	0.29
year 13	0.08	0.28	0.09	0.28	0.08	0.27
year 14	0.08	0.27	0.08	0.27	0.08	0.27
year 15	0.08	0.27	0.08	0.26	0.08	0.27
year 16	0.06	0.23	0.05	0.22	0.07	0.25
year 17	0.05	0.22	0.04	0.20	0.06	0.24
year 18	0.03	0.18	0.03	0.17	0.04	0.20
Number of children 0-18 years	2.80	1.31	2.87	1.34	2.69	1.24
Girl child	0.49	0.50	0.48	0.50	0.49	0.50
Household characteristics						
Per capita household expenditure (in logs)	12.13	0.59	11.94	0.49	12.44	0.60
Household has a health card	0.13	0.34	0.15	0.36	0.10	0.30
Mother can read	0.74	0.44	0.73	0.45	0.76	0.43
Father can read	0.73	0.45	0.72	0.45	0.73	0.44
Mother's education (Elementary)	0.37	0.48	0.42	0.49	0.29	0.45
Mother's education (Junior HS)	0.16	0.37	0.15	0.35	0.19	0.40
Mother's education (Senior HS)	0.17	0.37	0.09	0.29	0.28	0.45
Mother's education (Diploma)	0.03	0.16	0.01	0.12	0.04	0.21
Mother's education (Bachelor and higher)	0.02	0.14	0.01	0.08	0.05	0.21
Father's education (Elementary)	0.33	0.47	0.39	0.49	0.24	0.43
Father's education (Junior HS)	0.17	0.37	0.16	0.37	0.17	0.38
Father's education (Senior HS)	0.21	0.41	0.14	0.34	0.34	0.47
Father's education (Diploma)	0.03	0.16	0.02	0.13	0.04	0.19
Father's education (Bachelor and higher)	0.04	0.20	0.01	0.12	0.09	0.28
Community characteristics						
Rural location	0.62	0.49	1		0	
Distance to elementary school	0.14	3.06	0.22	3.88	0.02	0.35
Number of Junior High Schools	0.83	1.39	0.87	1.61	0.77	0.93

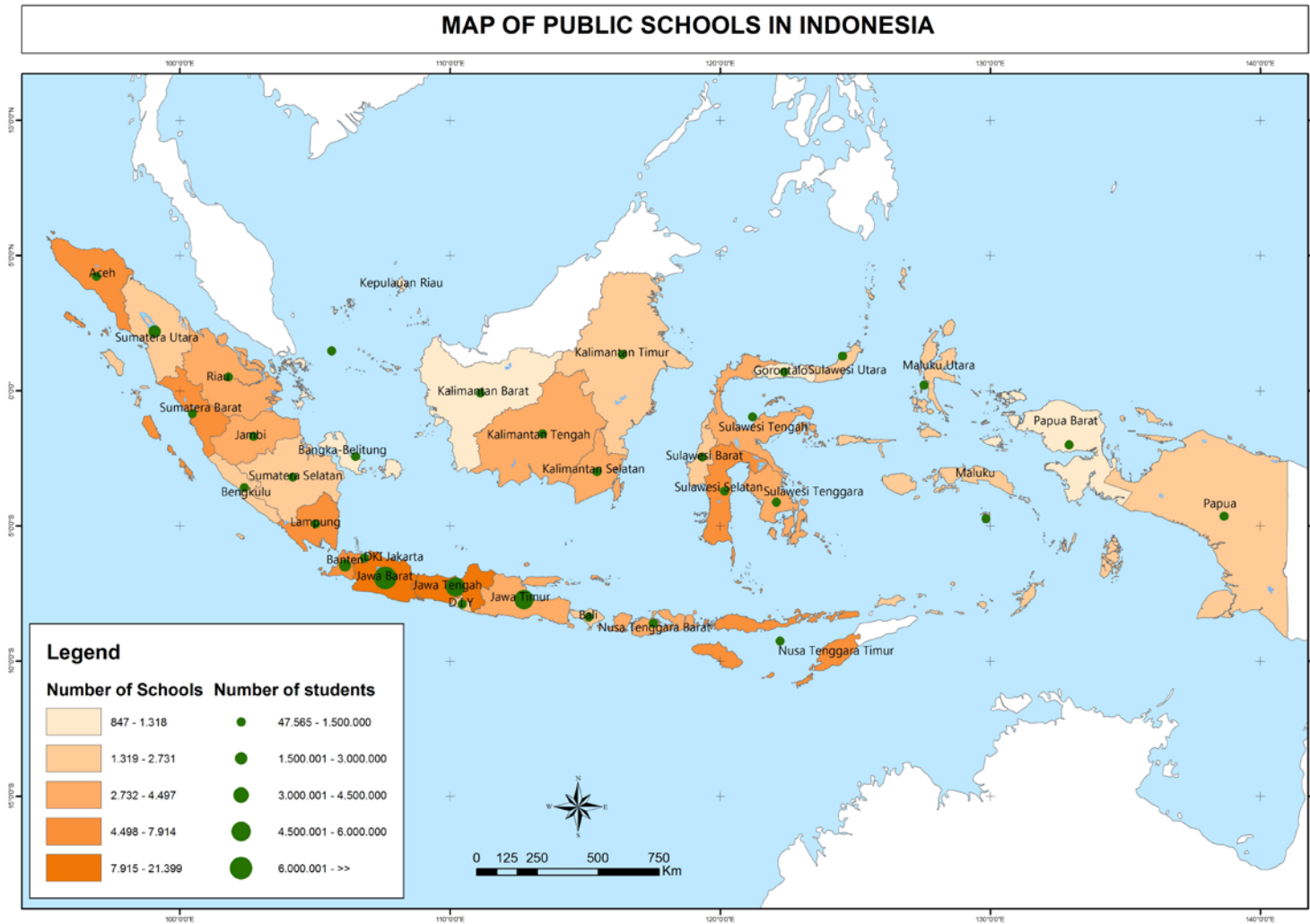
Number of Senior High Schools	0.35	0.82	0.27	0.84	0.48	0.75
Cooperative for savings and loans	0.57	1.91	0.47	2.02	0.75	1.71
Other type of cooperatives	0.40	1.57	0.34	1.51	0.50	1.66
Informal Microfinance	0.26	0.44	0.20	0.40	0.36	0.48
Provinces						
Java	0.31	0.46	0.23	0.42	0.43	0.50
Sumatera	0.27	0.44	0.28	0.45	0.26	0.44
West Nusa Tenggara	0.02	0.15	0.02	0.15	0.02	0.14
Bali and East Nusa Tenggara	0.06	0.24	0.07	0.26	0.04	0.20
Kalimantan	0.13	0.34	0.14	0.35	0.11	0.31
Sulawesi	0.15	0.36	0.18	0.39	0.10	0.31
Maluku Island	0.04	0.19	0.05	0.21	0.02	0.15
Papua	0.02	0.13	0.02	0.15	0.01	0.10
N	190658		117873		72785	

Note: (1) All community variables are from PODES and measured at the sub-district level. (2) Data on the “number of junior high schools” and the “number of senior high schools” are has been scaled by the population in the sub-district level.

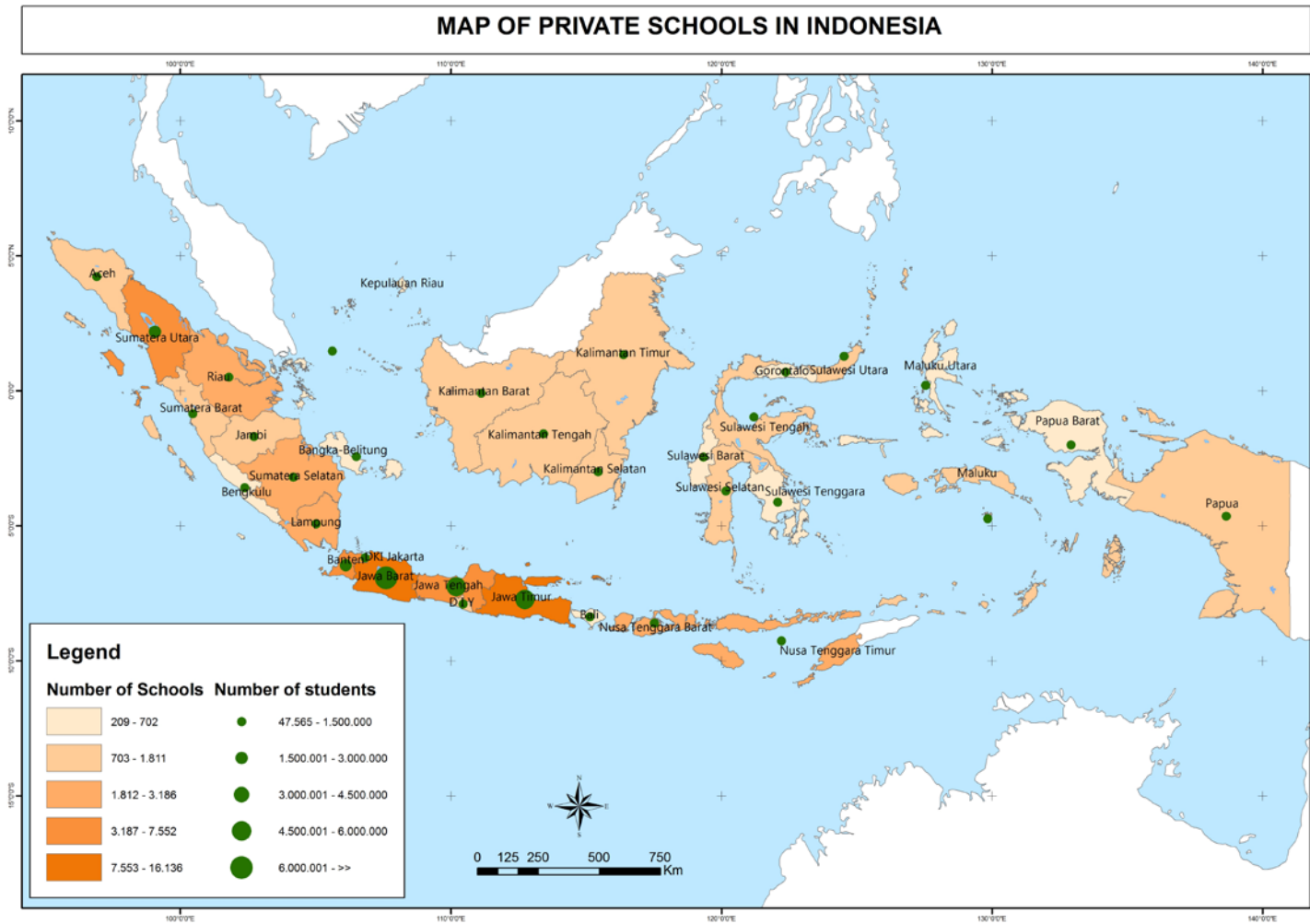
Appendix Figure 1: Spatial distribution of the number of Madrasahs and student enrolment in Indonesia



Appendix Figure 2: Spatial distribution of the number of Government schools and student enrolment in Indonesia



Appendix Figure 3: Spatial distribution of the number of Private (non-Madrasah) schools and student enrolment in Indonesia



Source: Authors, based on data extracted from various government reports.

Endnotes

ⁱ While there is evidence that educational attainment in Indonesia reduces public support for suicide bombings that target civilians, particularly among those with higher education (Shafiq and Sinno 2010), direct statistical evidence on the link between madrasah attendance and support for violence is limited. One survey conducted in 2003 revealed that most students at a particular brand of pesantrens “view America as an enemy, believe the Bali attack was organized by the U.S. to ‘damage the image of Islam,’ and say that they are eager to join a jihad” Murphy (2003). For a counter argument, however, see Pohl (2006).

ⁱⁱ One variant of madrasah in Indonesia is called the *pesantren*, a primarily rural-based Islamic educational institution which exclusively teaches Islamic subjects using classical Arabic books with the principal aim of producing religious authorities. However in recent decades, many *pesantrens* also offer non-religious subjects (Hasan 2008). Therefore, throughout this paper, we use the terms madrasah and *pesantren* interchangeably.

ⁱⁱⁱ A recently completed comprehensive study on Indonesian junior secondary madrasahs is Ali et al (2011). However the study only focuses on learning achievements.

^{iv} The author relies on cross-section analysis of junior madrasah enrolment based on 353 observations extracted from the Indonesia Family Life Survey (IFLS) 2007. So it is not possible to consider the full range of school types – madrasah, non-faith private and public schools - from which households and analyse how choice varies across various sub-groups such as regions and gender.

^v Existing international evidence indicates significant conservatism among madrasah students in general, and female madrasah graduates in particular, in relation to gender roles and attitudes (e.g. see Asadullah and Chaudhury, 2010; Asadullah, Amin, and Chaudhury, 2018).

^{vi} The largest of these organizations is *Nudwatul Ualama (NU)*, a *sunni* Islamic political organization which emphasizes traditional Islamic teachings and rejects a modernist outlook including pre-Islamic Javanese traditions. The second largest is *Muhammadiyah*, a non-political Islamic charity that is exclusively devoted to educational and social activities (Barton 2002).

^{vii} In Indonesia, non-religious schools follow the Ministry of National Education’s (MNE) curriculum. The MRA’s curriculum contains more Islamic coursework study hours than the MNE curriculum.

^{viii} On the other hand, *Madrasah Diniyah* is traditional type of Islamic schools in which their curriculum does not follow national curriculum. Some madrasah diniyah teaches general knowledge in addition to Islamic principal subjects. The school level consists of Awaliyah (elementary level), Ulya (junior level), and wustho (senior level).

^{ix} This share is significantly higher compared to the figures for earlier years. For instance, in 2002-3, these madrasahs accounted for 10.7% of schools. Their share was even smaller in the 1990s. According to Ministry Religious Affairs (MORA), there was approximately 9400 pondok pesantrens in 1997.

^x Overall Islamic school enrollment figures are slightly higher for girls than boys and much higher in Java than the rest of Indonesia (Kuipers 2011).

^{xi} For research on school choice in high income countries, see Long and Toma (1998), Le and Miller (2003), Cohen-Zada and Sander (2008), and Mavisakalyan (2012). For low income African countries, see Ajayi and Buessing (2015) and Goensch (2016). Goensch (2016) uses household survey data from northern Senegal jointly estimate Multinomial logit regression model of enrolment in formal and Koranic schools. He finds that younger children and boys are more likely to enrol in Koranic schools while older children and girls are more likely to attend a formal school. Ajayi and Buessing (2015) use data on 290,000 secondary school applicants in Ghana and find that schooling choices vary significantly with academic performance and educational norms.

^{xii} While the empirical analysis presented in Newhouse and Beegle distinguishes between madrasah and non-madrasah students, it doesn’t present any evidence on school type choice. Their focus is entirely on the impact of attending different school types on academic achievement. Another published study on Indonesia has similarly focused on the effect of private vs. public schooling on test scores by pooling religious and non-religious schools into a single category (e.g. see Bedi and Garg, 2000).

^{xiii} There is experimental evidence from South Asia which suggests a link between religiosity and pro-social behaviour. For instance, in a field study conducted in India, Ahmed (2009) finds that madrasah students are significantly more cooperative in the public goods game and significantly more generous in the dictator game than other students.

^{xiv} Available international evidence indicates that madrasah demand may be influenced by group identity and ethnicity (Dev, Mberu, and Pongou, 2016; Auriol and Demonsant, 2012; Antoninis, 2014)

and religious preferences (Asadullah, Chakrabarti and Chaudhury, 2015; Gemignani, Shojo and Wodon, 2014).

^{xv} Our model leaves out a fourth category of schools in Indonesia -- unrecognized madrasahs or pesantrens. This group primarily specializes in religious education and does not teach marketable skills. Therefore, unrecognized madrasahs do not serve as a substitute for formal schools in the labour market. The available survey data sets (e.g. SUSNES) on Indonesia also do not collect information on pesantrens enrolment.

^{xvi} When calculating the variable, we take out household spending on education since our choice of a school type can affect the level of spending on education.

^{xvii} In some Muslim other countries, opting to receive one type of education doesn't preclude receiving the other type. If so, this requires simultaneously modelling choice of different types (e.g. see Antoninis (2014) who estimates a bivariate probit regression for northern Nigeria).

^{xviii} For existing research on the importance of birth order in schooling decisions in Indonesia, see Marazyan (2011).

^{xix} Another limitation of SUSNES is that it does not provide any information on religious identity of individuals. Approximately 13% of the Indonesian population is non-Muslim who choose between private and public non-religious schools instead of sending children to madrasahs. While IFLS dataset contains information on religious membership, the sample size is too small to permit meaningful analysis of madrasah attendance in Indonesia.

^{xx} In total, 19124 children (out of 213270) could not be matched because of the absence of PODES data. This implies a loss of 8.9% of the original sample observations. However, the sample share of unmatched household cases is much smaller when we restrict the regression sample to those households who have children, with age between 5 and 23. When the characteristics of individuals in the main sample are compared with cases that could not be matched, we did not find any difference in the mean values of the dependent variable e.g. in both cases, the sample share of children enrolled in madrasahs (private and public combined) is around 5%. While there are differences in some control variables (e.g. the number of children and household per capita expenditure), the magnitude is not big.

^{xxi} AMEs calculate marginal effects at every observed value of the covariate and average across the resulting effect estimates. This contrasts with two other quantities of interest that can be derived from marginal effects: (a) Marginal effects at representative values (MERs) and (b) Average marginal effects (AMEs). MERs calculate the marginal effect of each variable at a specific combination of covariate values while MEMs use the means of the covariates to calculate the marginal effects of each variable.

^{xxii} This could capture the fact that in 1994, compulsory education in Indonesia was extended up to 9 years. This may have attracted a large number of children to public non-religious schools thereby equalizing the enrolment share of private and madrasah schools vis-à-vis public schools in the younger cohort of children.

^{xxiii} We tested this separately by estimating a version of the regression model without controlling for parental literacy and income. This confirms that the biggest drop in household income occurs (from -0.31 to -0.21) when we additionally control for parental variables.

^{xxiv} The finding of negative sorting effect (by parental education) is consistent with the earlier study on Indonesia by Bedi and Garg (2000). However, the authors also report negative sorting in case of private non-religious schools. The difference in terms of the latter finding could be explained by more fee charging private schools in recent years.

^{xxv} This finding is consistent with Chen (2004) who finds that economic distress increases Islamic school attendance. Credit availability reduces the effect of economic distress on religious intensity (or madrasah attendance of children) and religious intensity alleviates the need for credit to meet basic needs at the peak of the crisis.

^{xxvi} In addition, see for instance Zimmermann (2012) for evidence of male-bias in enrolment and Maitra, Pal and Sharma (2012) for evidence on gender discrimination in private school attendance. For a review of the evidence on the effects of policies to address gender gaps in education, see Glick (2008).

^{xxvii} Using sample survey data from Sumatra, Quisumbing and Maluccio estimate regression models on expenditure shares for food, health, education and children's clothing. They find no evidence suggesting discrimination against females in household expenditure. However, their sample comprises of only 114 households. Two other related studies are Suryadarma (2015) and Levine and Kevane (2003). Suryadarma uses IFLS dataset to examine the gender differences in numeracy among school-age children in Indonesia. He finds that, if anything, girls outperform boys throughout the schooling cycle. On the other hand, Levine and Kevane exclusively test for daughter disadvantage using IFLS

data albeit with a focus on virilocality (i.e. the practice of changing post-marital residence). They find no evidence of son preference or daughter disadvantage owing to virilocality.

^{xxviii} To study birth order effect net of the influence of family factors, we also re-estimated the model additionally controlling for household fixed effects following the dummy variable approach. However this strategy didn't succeed -- large number of household dummies led to non-convergence problem in a multinomial logit setting.

^{xxix} For a similar argument in the context of Pakistan, see (Lloyd et al. 2005).