Determinants of Gender Gap Reduction in Educational Attainment
A Study of Primary Education in Indonesia

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DETERMINANTS OF GENDER GAP REDUCTION IN EDUCATIONAL ATTAINMENT
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ABSTRACT
Using data from Indonesia, this research attempts to evaluate the impact of resources and characteristics of individual households as well as that of schooling access and quality on primary level educational attainment of boys versus girls (grades 1-6). In an effort to both enhance the quality of development and its effectiveness; the international policy discussion has shifted to addressing improvements to education access and systematic gender gap reduction. As countries move toward universal access to quality education they face financial constraints, inadequately trained and inefficient numbers of education professionals, as well as other policy limitations. Understanding country determinants to educational attainment across gender could, in fact, help prioritize a response, facilitating a more targeted approach for both national governments and the international assistance community. As a Muslim predominant country, Indonesia has managed to reduce its gender disparity in primary education enrollment over the years (Behrman, Deolalikar, & Soon, 2002; World Bank, 2007; Suryadrama, 2009). The international community is looking at Indonesia’s successes as lessons learned for application in other Muslim nations. A micro level analysis of education outcomes may give insight into the viability of such an application as well as into Indonesia’s policy decisions. This research will look at a 1993 case of Indonesia using the Indonesian Family Life Survey and Community Facilities Survey as provided by Rand Corporation. With this data, this research will analyze the varying impact of family characteristics, household wealth, and access to quality schooling on the gender differentials of primary level educational attainment.
DEDICATION

To my father who persistently reminded me to keep things simple; To my mother who pushed me to live outside of my comfort zone; To my brothers who inspired my determination; I dedicate this work to you.

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I would like to thank my thesis advisor, Andrew Dillon, for his unyielding patience and guidance through this process. I also extend great appreciation to my friends at Georgetown Public Policy Institute for keeping me sane through moments of data chaos.
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I. INTRODUCTION

Educational attainment has taken center stage in the international development arena. Policy pertaining to educational attainment is seen to have direct impact on poverty and health mitigation, human development, human capital and economic growth (see, Lau, Jamison, & Louat, 1991; Glewwe & Ilias, 1996; Ito, 2006). Education is seen as a generational capacity builder and as a major stepping-stone to capabilities development—it is indicators deemed to be universally transferable. The Education for All Conferences and the United Nations Millennium Development Goals (MDG) illustrates the momentous shift from mere economic growth to holistic social and political development with education at its core, as a fundamental human right. Education policy has also become a major platform for integration of gender equality and female empowerment programming, establishing educational attainment indicators as a strong measure of social progress and the potential for economic achievement.¹ For this reason, the first target for achieving the universal primary education MDG is to ensure that all children, boys and girls alike, are able to finish a full course of primary schooling (United Nations, 2010).

It is under this premise that many developing countries today are striving to meet international education targets by way of achieving their own national education goals. A broad coalition of civil society groups, development agencies, and multilateral organizations show support by including education and gender disparity reduction policy in their respective development frameworks. However, as counties move toward universal access to quality education they face financial constraints, inadequately trained and inefficient numbers of

¹ Examples of key indicators are net enrollment in primary education, proportions of pupils who actually reach grade 6, and adult literacy rates for men and women. MDG monitor follows the progress of target by way of these indicators. See, http://www.mdgmonitor.org/goal2.cfm#.
education professionals, and other policy limitations. Understanding country determinants to educational attainment across gender could, in fact, help prioritize a response to such constraints and continued efforts to systematically eliminate gender disparity and extreme poverty through the realm of education.

Developing countries are typically characterized by a gender gap in schooling, where women have significantly less education than men and, by consequence, are significantly less literate (Deolalikar, 1993; Burney & Irfan 1995; World Bank, 2007). The World Bank maintains that higher illiteracy rates for women are the direct result of lower school enrollment and early dropouts (2007). However, it also indicates a minimal disparity in lower-middle income countries. For example, the average female-youth literacy rate for lower-middle income countries was 88.9 percent in 2007, as compared to the 93.3 percent for an average male-youth. For the same cohort of countries, primary net enrollment rates were 89.5 percent for females and 91.4 percent for males (World Bank, Gender Stats, 2009). Again, this indicates a minimal gender-gap.

Indonesia falls under the lower-middle-income category of countries, maintaining a progressive reduction of gender differential in educational attainment as a Muslim predominant nation. With nearly universal levels of primary educational attainment, Indonesia had 99.6 percent of primary school age children enrolled in or graduated from primary school by 1998.

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2 It should be noted that the World Bank also finds that because women generally have less access to information and training/literacy programs estimates based on enrollment may actually overestimate literacy for girls. See, World Bank. Gender Overview. http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/EXTMNAREGTOPGENDER/0,,menuPK:493341~pagePK:51065911~piPK:64171006~theSitePK:493333,00.html.

Also, with regards to the country classification of Lower-Middle Income, the World Bank divides the group by GNI per capita. For more see, http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20420458~menuPK:64133156~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html.


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In 1992, Indonesia’s primary education net enrollment ratio was estimated to be 88.7 percent, which increased to 92.7 percent by 2002.\textsuperscript{4} While this reality parallels averages across the East Asia/Pacific region, when compared to other Muslim predominant nations this achievement seems more substantive.

There is said to be both cultural and economic factors associated with particular regions that reinforce a gender gap (Hiller, 2008; Lopez-Claros & Zahidi, 2005). The Muslim predominant nations of the Middle East and North Africa seem to maintain as systemic gender gap related to cultural norms that cuts across most sectors of life, including education. Some studies indicate a negative correlation between the share of Muslims in a population and education outcomes (Glewwe & Ilias 1996; Suryadrama, 2009). However, there is a renowned lack of a gender gap, among the world’s largest Muslim population, in Indonesia. Many nations look to Indonesia for lessons learned; and there has been public acknowledgement that Indonesia’s success may or should serve as a model for other Muslim countries (Kurlantzick, 2009). To make such a normative reach, however, it would serve us well to understand the determinants of cross-gender educational attainment—enrollment rates, dropout rates, and repetition rates, lags in academic promotion—among Indonesian families. Moreover, analysis at the household level could inform Indonesia’s efforts for reducing the gender gap among junior and senior secondary levels of education, highlighting the effectiveness of targeted education policy. The key question, thus, becomes: what has played a more instrumental role to gender gap reduction, household background and composition, household wealth, or schooling access and quality, in the case of Indonesia?

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Literature regarding educational attainment splits into a variety of branches, though all intrinsically linked to development and policy effectiveness. Authors such as Krueger and Lindahl analyze the returns to schooling through both micro-labor and macro-growth perspectives, determining the effect of schooling attainment (2001). Other studies measure the determinants that have caused a lag between differing ethnic and religious populations (Glewwe & Ilias, 1996; Demack et al., 2000; Suryadarma, 2009). Many scholars have looked at determinants of educational attainment with competing methodology (see Glewwe & Ilias, 1998; Tansel, 2000; Kingdon, 2001; Suryadarma et al, 2006), which will be used to guide the research and analysis of this thesis. This paper will examine a cross-section of household composition, household wealth, as well as child access to quality schools for the primary-level age cohort in 1993 Indonesia. The Indonesian Family Life Survey and the Community Facilities Survey, provided by Rand Corporation, actually consists of four waves of longitudinal data. This includes IFLS 1 (1993), IFLS 2 and IFLS2+ (1997/1998), IFLS3 (2000), and IFLS4 (2007). While all four waves of are available, for the purposes of this study, IFLS 1 will be used as it falls before the national implementation of expanded compulsory education. It is through the analysis of relative impact of demand (household characteristics and wealth) and supply (facilities access and quality) determinants that this thesis will contribute to the studies on educational attainment in the developing world; better understanding the foundational circumstances that led to effective gender gap reduction-policy in Indonesia.

I organize this paper as follows: Section II introduces a brief background of the Indonesian public school system and compulsory education policy; Section III provides a comprehensive review of the pertinent literature on educational attainment in developing countries, the impact of household background, composition, and wealth, as well as the effects of
the added determinant of school access and quality on education outcomes; Section IV describes
the data used in the paper and lays out the model of approach used to conduct analysis; Section
V then presents the descriptive statistics and the primary preliminary findings of this paper;
Section VI provides a discussion of the results and analysis of the regression models; and
Section VII concludes this research.
II. BACKGROUND

*Education History and the Role of Women*

The role of the Indonesian woman was instrumental to the national target of universal primary education. Its success dates back to Indonesia’s independence movement whereby the struggle to improve conditions for women focused on the provision of education for Indonesia’s female population (Robinson & Bessell, 2002). Men and women, alike, supported the idea of universal education; the sentiment was that the educated women would be able to productively contribute to the national emancipation movement; as a result, the voice of women’s emancipation was closely tied to the movement against Dutch colonial power. While the women’s movement in Indonesia vacillated in and out of the margins of the public sphere after Indonesian independence, they would soon be better represented. The progressive period took hold of the 1950’s, as did the government’s initial push for universal primary education.

Indonesia was proclaimed independent from Dutch sovereignty in 1945, though formal transfer of power over the archipelago did not occur until late 1949. Fifteen years of political instability and economic decline ensued, defining Indonesia’s Old Order regime. While there

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*Under the Ethical Policy’s of Dutch colonial rule a progressive move was made to allow girls to be educated along with boys though more often then not the woman would return to her traditional role in the domestic domain with limited decision-making power. See, Adrian Vickers,. *A History of Modern Indonesia*. Cambridge: Cambridge UP, 2005. Print.*
was an extraordinary growth of schools and universities during this period, per capita expenditure remained extremely low (Beeby, 1979). Education access was to remain a key goal for the Indonesian government; however, the residual effect of its colonial history, left Indonesia facing many inequalities—between the provinces, between rich and poor, and between adults and youth—making achievement and sustainability of universal education a difficult task in need of much more investment. As a result, the target of universal primary education had only been reached a decade after the major oil windfalls of 1973, when primary education became compulsory—still a persisting gender gap existed (Frederick & Worden, 1993).

By 1993, Indonesia was a country of approximately 188 million in population spread over 3,000 islands. Indonesia’s complex ethnic structure and 250 languages would only further complicate its education policy, but by the mid-1990s, great strides had been made in the distributional equity of the education system. There were improvements in the gender (female/male) ratio at all levels of education. The gender ratio of primary enrollment had risen to 93 percent, while that of the senior secondary level reached 88 percent by mid-1990s, compared with 50 percent in the mid-1970s (Behrman, Deolalikar, & Soon, 2002). For a period of time Indonesia’s policy priority shifted from mere access to expansion of universal schooling, in attempts to meet growth rate of the school age population. This steady expansion culminated in the Presidential Decree of 1994 on the Declaration of Universal Nine-Year Basic Education marked the implementation of an expanded universal education program—gains from which would only to be threatened and potentially reversed by the 1997 financial crisis.

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7 Indonesia since 1994 defines compulsory basic education as nine years: six years of primary education (for ages 7-12 years) and three years of junior secondary education (ages 13-15 years).
The Indonesian Government refocused its priorities to maintain its gains. Today the primary school system in Indonesia is still nearly universal and maintains a minimal gender disparity among its predominantly Muslim population. Furthermore, the World Bank (2009) indicates that as recent as 2007 Indonesia’s Secondary school system has been characterized with a reverse gender gap (though slight). The primary school system in Indonesia covers the first to sixth grades, at the end of which children must pass a national examination in order to qualify to the secondary level.

**Indonesian Education System**

The nine-year compulsory basic education program attempts to provide education for every Indonesian. While schools are established and administered by different types of bodies, most follow the pattern of schools under the Department of Education and Culture, maintaining a 6-3-3 structure (Beeby, 1979). So, formal schooling begins at the age of 6 and ends at the age of 15, with 6 years of primary and 3 years of junior secondary; this can be followed by 3 years of senior secondary schooling. To determine progression to junior and senior secondary schools students take a national final examination, called the Ebtanas, at the end of the primary and junior secondary levels. Indonesia also has an informal schooling system an out-of-school primary education equivalency program, an out-of-school junior secondary program, and a distance learning junior secondary program (Behrman et al., 2002).

In terms of curriculum, the content of compulsory primary education consists of subject

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9 It is important to note that this alternative education form as it may impact the number of observation in our pool of study.
matter covering Pancasila education, religious education, citizenship education, Indonesian language, reading and writing, mathematics, introduction to science and technology, geography, national and general history, handicrafts and art, physical education and health, drawing, and the English language.  

**Schooling Access and Quality**

While Indonesian Government’s commitment to education dates back to its efforts to provide universal access to primary education in the 1950s, the expansion of primary schooling accelerated in 1970s with the construction of 61,000 primary schools with windfall oil revenues channeled through a Presidential Instruction (Inpres) block grant (Behrman et al, 2002). The Government had maintained fiscal equalization measures and recycled its windfalls through routine and development budget expenditures ensuring that all provinces shared in the oil and foreign aid booms. When education expands rapidly, as it has in Indonesia, the composition of educational attainment groups by economic class also changes; this means that girls from lower socio-economic groups actually complete primary education and promote to lower secondary (Hill, 1994).

The initiatives of the New Order regime expanded education to the point of near universal primary education and illiteracy almost disappeared among Indonesia’s younger population. Strong effort to achieve educational attainment outcomes by lagging regions also marked a reduction in regional disparity over the years leading to the 1990 scenario for Indonesia. By the mid-1990s, Indonesia had about 30 million students enrolled in primary schools and 8.4 million in junior secondary schools—a size that simply underscores the degree

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10 There is much provincial and district flexibility with application to best suit kabupaten (regencies) culture and standards contributing to the retention of regional and ethnic identities and needs. See Hill, ibid.

11 There was no assurance, however, that a need-based criterion was followed by local administrations. See, ibid.
of Indonesia’s achievement. Female and male enrollment in 1990 was 94.9 percent and 98.6 percent, respectively. This translated into a female adult illiteracy of 18.1 percent by 2000, an approximate 10-percentage point decrease from female adult literacy in 1990.\(^{12}\) The abolition of primary school fees is thought to be a major contribution to these outcomes, reducing the cost of enrollment. The official expansion of the compulsory education to 9 years in 1994 and the abolition of junior secondary school fees should further contributed to this process.

In terms of quality, however, the rapid expansion of primary education in Indonesia left much to be desired, partially due to the removal of school fees and increased number of students given access. The quality of Indonesia’s primary education system ranged from good to very poor. There was a high proportion of inadequately trained teachers, lack of teaching aids, shortage of teaching materials, high absenteeism, high dropout rates before functional literacy. Furthermore, the schooling infrastructure, itself, was very basic and at times did not even offer adequate protection for its students. These fissures were more noticeable between East and West, urban and rural, as well as among rich and poor of Indonesia.

\(^{12}\) Educational Statistics are based on UNESCO estimates, and compiled by Globalis. See, http://globalis.gvu.unu.edu/.
III. LITERATURE REVIEW

The importance of education as a goal for economic development as well as a determinant for poverty alleviation has been widely recognized. Accordingly, empirical studies regarding education attainment split into two categories: (1) the micro versus macro economic impact of educational attainment or (2) the determinants of educational attainment, itself to better understand the micro level characteristics that influence a gender gap in educational outcomes. It is the later that will be the focus of this paper though a foundation of the macro implication of schooling will be discussed to establish a foundational understanding. For the most part, however, this research will attempt to better understand the links between various determinants: household characteristics, household wealth, as well as schooling access and quality.

Educational Attainment in Developing Countries

Investment in human capital has become more integral to the development process and the achievement of sustainable economic growth (see, Von Witzke, 1984; Lau, Jamison & Louat, 1991; Glewwe & Ilias, 1996; Ito, 2006). The UNDP reports on Human Resource Development list education as one of five factors that contribute to the betterment of labor force quality and socio-economic growth, addressing distributional inequalities that may exist in societies. Many of the least developed nations have implemented national expansion policy regarding educational facilities to better adult literacy rates, in effort to contribute directly to development.

Studies focusing purely on the impact of education conclude that developing human capital is necessary for economic growth and human development. Others, mainly focusing on conflict environments, link political and economic stability to education attainment. Save the Children finds that one year of education can raise the living wage of men and women by an
average of 10 percent in *conflict affected fragile states*. Wedge further elaborates on the finding that every additional year of formal schooling, for males particularly, reduces the risk of involvement in conflict in these fragile states (2008).

Most studies regarding the impact of education analyze the improvement to technical and allocation efficiency leading to productive populations (see, King & Lillard, 1983; Shultz, 1975; Burney & Irfan, 1995). Schultz suggests that education improves a household decision-making in terms of efficient production adjustment (1975). Bredie and Beeharry extend this concept to the impact of educational attainment on economic growth through a cross-section of developed and newly industrialized nations to find patterns of macro-return (1998). The results determine that a minimum level of education is required for a country to experience economic growth. However, Bredie and Beeharry further express a concern in the trend of schooling stagnation in developing nations. They claim that in order to “…help reverse this stagnation, we need to understand better what is happening” (1998, p iv). This research concludes that high costs of education and uncertain benefits of schooling are leading to the slowing of schooling attainment. Though Bredie and Beeharry do not move beyond speculation of theory, they do assert that there is an opportunity cost that is internalized in the decision-making process behind educational attainment (1998).

Moreover, there exists a more focused line of study, addressing the woman’s role in development and the impact of her education. Schultz delves into the topic of returns to women’s education asserting that the “high returns to investing in the education of women are indisputable”, alleging that the lack of investment in women’s education is associated with the sparseness of detailed studies (King & Hill, 1993, p51). Determination of social and economic externalities from the education of boys and girls falls beyond the scope of this paper’s research;
however, in gaining a more thorough understanding of the effects of education, of men and women alike, on economic growth/development of a country, we indirectly gain insight into intergenerational effects on educational outcomes. The above studies introduce the reader to, and nicely cycle into household decision-making power as shaped by additional years of adult education as well as economic improvements. If policy is to be targeted to human capital, country context through household background and economic characteristics will only further supply intuition behind trade-offs, motives, and potential policy incentives.

**Demand-Side Factors: Household Background**

Family decision-making of a child’s educational attainment develops from both household background (Section A) and household wealth (Section B). The link between these factors and educational outcomes as well as the varying impact between them will both highlight the targeted nature Indonesia’s policies as well as serve as guide to future approaches to education interventions.

The intergenerational mobility in education is a key determinant in many studies (see, King & Lillard, 1983; Lillard & Willis, 1994; Burney & Irfan, 1995; Glewwe & Kremer, 2005; Ito, 2006; Orazem & King, 2007). This holds true, to the extent that child schooling reflects parental capacity to invest in human capital formation (Schultz, 1975; Burney & Irfan, 1995). Thomas (1996) assesses the influence of South African parental education on that of their children. He concludes that, while controlling for age and gender, both maternal and paternal education significantly influence child-schooling attainment. He further notes that while parental-education effects are not significantly different in the case of South Africa, maternal education has a larger impact on the human capital of children in most other countries. A Rand study on the determinants of schooling in the Philippines found that children with higher-
schooled parents are more likely to promote to higher levels of schooling (King & Lillard, 1983). More specifically, the research concluded that if mothers had one more year of schooling than their actual levels, the schooling levels for female children raise more than those of their male counterparts (King & Lillard, 1983).

There is gender-disaggregated evidence in Pakistan regarding the impact of parental education on child schooling. Burney and Irfan (1995) analyzed households’ child-schooling behavior in Pakistan to explain differences in school enrollment across gender and age cohorts. Their findings show that of boys eligible for primary education in farming households are 10 percent more likely to be enrolled in primary school if the father completes a primary level of education rather than no schooling at all. This magnitude is greater for a mother’s change in education level. Here, Burney and Irfan find a 22 percent increase in the probability of boys’ enrollment should the mother have at primary level of education as opposed to none. However, the probability change of girls attaining education is not as substantive for the same age population of females. Lillard and Willis (1994) analyze the intergenerational transmission of human capital with further scrutiny, indicating that two-thirds of the impact of Malay parental education on their children appears to be a direct consequence of parental schooling. Moreover, they find that these direct effects predominately influence children of the same gender and that the direct effect of a mother’s educational attainment and a daughter’s schooling is stronger than that of a father’s on his son’s (Lillard & Willis, 1994).

Apart from parental education many studies control for a variety of demographic qualities of the household. Indonesia is an extraordinarily diverse country in its economy, demography, social structures and culture. The household would reflect this diversity accordingly, impacting the demand for schooling to the extent that they sway a head of household to send his son or
daughter to school. These would include: province, urbanization, household religion, and number of members per household. In the case of Indonesia, regional disparities were on the decline during the period of the New Order, leading up to the 1993 IFLS survey duration; with the expansion of economy, also came the easy migration of people and transfer goods across provincial boundaries. Instead of the original disparity found during colonialism between Java and the outer islands, a new regional dichotomy based on inequalities between East and West Indonesia (Beeby, 1979; Ricklefs, 2001; Vickers, 2005). Still, as Indonesian policy has been rooted in the maintenance of local culture, customs, and traditions; accordingly, provincial variables will serves as a control for unobservable characteristic inter- and intra-household.

A similar concept applies to the urban or rural characteristics of a household residence. In fact, most studies use this attribute to draw correlations between development, poverty, and the ratio of female-to-male enrollment. Religion generally accompanies literature regarding gender gap as in can serve as link to parental perception of gender. Finally, number of members in the household (or number of children) is intrinsically linked to cost of education investment and expenditure allocation.

Demand-Side Factors: Household Wealth

Schultz states, “No matter what part of a modern economy is being investigated, we observe that many people are consciously reallocating their resources in response to changes in economic conditions” (1975, p827). This concept can be applied to the human capital found within a nuclear household. A more specific look into determinants of educational attainment by gender will afford opportunity to efficiently invest in people, or rather human capital by offsetting the economic costs of education.
The parent’s decision to send a child, boy or girl, to be educated would depend on a series of trade-offs. Thomas maintains that “educational attainment is influenced by both public and private investment, with parental resources being key determinants of child education” (1996, p332). Accordingly, the effectiveness of policy targeted at improving child educational attainment, among boys and girls alike, is often a direct result of the degree to which said policies caters to household perspective of cost and benefits (Tandon, 2006). Evidence from Pakistan indicates that the presence of a school in the locality did not influence enrollment decisions once the model controlled for parental income and education (Burney and Irfan 1995).

Even more pertinent, a longitudinal study of Indonesia at the time of the major financial crisis of 1998 illustrates a reverse in the, once, upward trend of enrollment (Thomas et al., 2004). Thomas et al. (2004) use changes in household per capita expenditure to evidence that budget allocation for child-related human capital was on the decline especially for the poor. The empirical evidence shows that after the near achievement of universal primary education for the age cohort of 7-13 in 1997, the fraction of non-enrollment increased for all boys ages 8-15 and girls 7-13; for boys age 10-20 and girls age 9-11, the increase of non-enrollment was between 10 and 25 percent (Thomas et al., 2004). Some studies use net income or assets as measurements of wealth. Pritchett (2004) uses asset possession, as proxies for long-term wealth to find regional patterns in educational attainment. Particularly he found generally smooth patterns of attainment across the transition from primary to secondary levels of school (2004).

Overall, economic well-being Understanding the household and community level factors that are associated with educational attainment by gender will assist in setting priorities for policy and investment. In the case of this research, it will attempt to provide reasons as to why Indonesia’s policy led to, nearly, universal levels of educational attainment at the primary level.
Supply-Side Influences: Access and Quality

This research is an opportunity to determine the impact of education access and quality on the predicted probability of female education attainment in Indonesia. Ito states, “[The supply-side of schooling] is directed at reducing the access costs borne by households, such as access school expansion, providing safe and cheap transportation, setting school schedule that accommodates the seasonality of local labor demand, reducing discrimination and intimidation, running schools only for girls when local custom requires” (2006, p206). He further affirms that enhancement of school quality (e.g. improvements to school facilities; teaching materials; curricula; and teacher quality and quantity) also falls under supply-side factors (2006).

The World Bank (2009) indicates that access to schooling in developing countries as improved since 1990, stating that 47 out of 163 nations have already achieved universal primary education. There are many studies that look to access as a determinant up until a certain point (see, Filmer, 2005; Ito, 2006; Orazem & King, 2007). Burney and Irfan (1995) look at the proximity of schooling facility at the village level as a supply factor influencing the household decision to educate the child. As mentioned before, the effect was not as great once parental income was controlled for. There is much debate on the impact of access itself. Ito (2006) finds that, as community-level influences impacts will not be uniform intra-household. In Ito’s supply-side results, he notes that Indonesia’s school expansion and increase of teachers (1973-1978) added 0.12 and 0.19 year of schooling, respectively. Filmer also finds that building a school where once none would increase enrollment only by a small magnitude; though Handa (2002) notes the affect is far greater among the female poor.

Many studies employ variables of school distance in terms of either school presence at the village/provincial levels or travel time (see Glewwe & Ilias, 1996; Burke & Beegle, 2004;
Filmer, 2007). Filmer (2007) compiles these results to further his own study on access and enrollment. In a study of 21 developing countries, he finds that while school availability is statistically significant it is not very substantively significant; however, he also mentions that other studies have found that the greater the distance to primary school is associated with and older start age of first time enrollment. In a retrospective analysis of Mozambique, Handa (2002) indicates the increasing access to schooling from 69 to 79 percent would, in fact, lead to a 13-percentage point enrollment increase.

Another strand of supply-side factors developed in studies and it is that of quality schooling indicators. Glewwe (2009) uses the case of Ghana to measure the relative impact of school quality and economic growth on enrollment. Deolalikar (2005b) finds that improvements in schooling quality, proxied by the pupil–teacher ratio at the primary level, as opposed to improvements in access had more of a positive effect on school attendance in Pakistan.
IV. **DATA AND METHODS**

*Dataset and Survey*

The Indonesian Family Life Survey (IFLS) is an on-going national longitudinal household survey conducted and publically provided by RAND, in conjunction with Lembaga Demografi, Faculty of Economics, University of Indonesia. The sample is representative of about 83 percent of the Indonesian population and consists of more than 30,000 individuals living in 13 of the 27 provinces in Indonesia. The four waves of IFLS accompanied by Community Facilities and Services Surveys (CFSS) allow for a comprehensive examination of individual, household and community level data—capturing a rich dataset regarding economic wellbeing, education, migration, labor market outcomes, health, and inter-household support. In addition, the IFLS can support analyses of urban-rural and gender differences.

The first wave of IFLS (IFLS1) was conducted in 1993/94. The IFLS2 and IFLS2+ were conducted in 1997 and 1998, respectively, where the IFLS2+ covers a 25 percent sub-sample to gauge the immediate impact of the Asia financial crisis.\(^{13}\) The IFLS3 was fielded in 2000 and covered the full sample once again. The fourth wave, IFLS4, was fielded in 2007/2008 and also covered the full sample. The Center for Population and Policy Studies (CPPS) of the University of Gadjah Mada, and Survey METRE also participated in the survey implementation of this most recent wave.

The IFLS is unique in several regards: (1) it is multipurpose due to the broad array of collected information on individuals, households, and communities; (2) both the household and community level data collected address both current and retrospective information; (3) the

\(^{13}\) For the purposes of this paper, there will be a focus on IFLS 1 1993 data. It represents the a period before the extension of compulsory education to the junior secondary level.
datasets provide information on a large age range of individuals; (4) it allows opportunity for integration of individual, household, and community data; and (5) the IFLS has a high follow-up rate, so sample attrition bias is not likely to be a major concern. In IFLS1 7,224 households were interviewed, and detailed individual-level data were collected from over 22,000 individuals. In IFLS2, 94 percent of IFLS1 households and 91 percent of IFLS1 target individuals were re-interviewed. In IFLS3, 95.3 percent of IFLS1 households were reconnected and in IFLS4 the re-contact rate was 93.6 percent. Among the IFLS1 dynasty households (any part of the original IFLS1 households) 90.3 percent were either interviewed in all 4 waves or died, and 87.6 percent were actually interviewed in all four waves.

While longitudinal data is available, this research will be limited to a cross-sectional analysis of IFLS 1. Again the 1993 data covers a sample of 7,224 households, across 13 provinces encompassing 83 percent of the Indonesian population. After we eliminate from our sample those families with no children of at least school age, and a few with missing data, we are left with 3,495 families with 4,709 children (ages 6-15). There is often two measurement issues that accompany a quantitative study of schooling in developing countries: (1) defining quantity and (2) and matching current and historical data on schooling to the individual child; however, the thoroughness of the IFLS and CFSS allows us to circumvent such limitations. Every individual is connected to a household and every household to a community—unique identity variables connect the various datasets enabling this research to map out household and community characteristics across individual children.

**Conceptual Framework**

This section presents a simple framework that will serve as foundation to understanding the determinants of Indonesian gender gap reduction at the primary level of education. This
research will use a three-tiered model, whereby the demand-side determinants of child educational attainment is divided into household background as well as wealth factors; in addition, the supply-side determinants are identified by schooling access/quality characteristics. 

Figure 2 is an illustration of the abstract model applied in this research.

Figure 2: Visual of Conceptual Framework

There are, of course, unobservable factors that may be contribute to a child’s educational attainment or lack there of. The heterogeneity of Indonesia and the regional diversity of customs, whether religious or cultural, will inevitably influence a household’s decision to send a child to school. Obviously some preference and child motivation or innate ability determinants will remain to be unobservable; therefore, they must be incorporated into the residual term inducing endogeneity in our model. Unfortunately, as this research is limited to a cross-sectional analysis
absorbing the fixed effect of child ability is unlikely and the elimination of household preferences from our error term will not be possible to its fullest extent. While household-level preference (taste) for schooling is not directly captured by the data, the framework of this research will attempt to reflect such preferences through both head of household educational attainment (in years) as well as control variables, such as the province in which household resides and the urbanization of the area of residence.

In order to capture the nuances of educational attainment as they apply to gender differentials, or lack of, this research will engage four different, but interconnected educational outcome variables: enrollment, repetition, dropout, and child left behind. Figure 3, below, illustrates the linkages of these outcomes as it relates to the overall latent propensity of a child to attain primary education.

Figure 3: Visual of Outcome Variables
Data Analysis Plan and Methods

For policy purposes, the relative impact of various household and school characteristics on school attainment would be interesting to gauge. This assessment is intended to evaluate the following question:

To what extent has educational attainment and the convergence of gender differentials at the primary level in Indonesia been a consequence of resources and characteristics of individual families and to what extent has it been a consequence of Indonesia’s exponential increase in schooling facilities and the state of school quality? The hypothesis, here, is that the magnitude of impact varies between these demand-side and supply-side determinants; moreover, there will be a two lines of demand-side determinants—household wealth versus household characteristics— that will also see a variance in effect; The various components of the hypothesis will be included as different vectors of analysis in the econometric specifications below.

The functions for educational attainment can be depicted as follows:

Equation (1)
\[ \Pr(E_t = 1) = F(\beta_0^j + \beta_1^j H_t + \beta_2^j W_i + \beta_3^j C_i + \mu_t^j), j = m, f \]

Equation (2)
\[ \Pr(D_t = 1) = F(\beta_0^j + \beta_1^j H_t + \beta_2^j W_i + \beta_3^j C_i + \mu_t^j), j = m, f \]

Equation (3)
\[ \Pr(R_t = 1) = F(\beta_0^j + \beta_1^j H_t + \beta_2^j W_i + \beta_3^j C_i + \mu_t^j), j = m, f \]
Equation (4)

\[ \Pr(B_i = 1) = F(\beta_0^j + \beta_1^j H_i + \beta_2^j W_i + \beta_3^j C_i + \mu_i^j), j = m, f \]

where,

- \(i\) indexes the individual child;
- \(j\) indexes gender (\(m = \text{males}, f = \text{females}\));
- \(F()\) cumulative Probit distribution;
- \(\Pr(E_i = 1)\) the probability of child \(i\) being enrolled in school;
- \(\Pr(D_i = 1)\) the probability of child \(i\) dropping out;
- \(\Pr(R_i = 1)\) the probability of child \(i\) repeating;
- \(\Pr(B_i = 1)\) the probability of child \(i\) falling behind in academic promotion;
- \(H\) vector of household characteristics, schooling of household head and spouse, and ethnicity;
- \(W\) vector of household wealth characteristics, income, net assets, electricity access;
- \(C\) vector of community-level characteristics, including schooling infrastructure and distance from school; and
- \(\mu\) error term.

The school enrollment variable, \(E_i\), the child dropout variable, \(D_i\), the repetition variable, \(R_i\), and the child left behind variable, \(B_i\), are each dichotomous. The variable, \(E_i\), assumes the value of one if the child was in school at the time of the survey and zero otherwise; the variable \(D_i\) assumes the value of one if the child had dropped out of school at the time of the survey and

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14 Most, if not all, of the schooling infrastructure considered with the data is publically provided and is minimally influenced by local demand for schooling. Its inclusion as an explanatory variable, thus, is important.
zero otherwise; the variable, $R_i$, assumes the value of one is the child has repeated at least one year of primary schooling at the time of the survey; finally, the variable $B_i$, assumes the value of one is applied to a child is lagging with regards to academic promotion based on expected start age of 6 or 7 (i.e. it implies a non-start, late start, repetition, and/or dropout). Accordingly, equations (1), (2), (3), and (4) are estimated by the maximum likelihood Probit estimation method.

The vector household characteristics ($H_i$) will control for as many demographic factors as possible by including, province of residence, urbanization of residence, religion (though the group of interest is the Muslim population), age of child, gender of child and schooling of household head. Under this vector the independent variables of interest are: gender of child, religion, and schooling of household head. The vector of household wealth ($W_i$) will represent various market forces that contribute to family decisions on child schooling. These include (i) total value of household assets, as well as proxies for socio-economic status—(ii) household electricity usage.

The vector of community characteristics ($C_i$), data on which is obtained from both IFLS Child Individual Data and Community Facilities Survey, includes several variables of interest regarding access and type of access to education: (i) the existence of primary schools among province in the household’s province of residence, (ii) the existence of a primary school in the household village of residence, (iii) the distance of school by way of travel time, (iv) the number of students per school and (v) the quality of school facilities by proxy of flooring type. As Indonesia provides public schooling the distance and access variables also reflect the indirect cost of schooling for households.

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15 While the vector of wealth characteristics ($W_i$) falls under the household-level variables, it is an integral exogenous group of variables for this model and will therefore be represented in another category.
The next section contains some of the preliminary findings of this paper in form of primary descriptive statistics.
V. DESCRIPTIVE STATISTICS

Table 1 below displays the number of observations, the mean and the standard deviations of the four dependent variables constructed to capture child educational attainment. These variables are integral to the understanding of educational attainment and outcomes for boys and girls of Indonesia. As mentioned before each variable addresses a deviation of child enrollment status, in hopes to better understand the micro-level determinants of gender gap reduction in Indonesia.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>N</th>
<th>Percent</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment Status (1=Enrolled)</td>
<td>4709</td>
<td>86.52</td>
<td>0.865</td>
<td>0.342</td>
</tr>
<tr>
<td>Repetition Status (1=Child repeated a primary grade at least once)</td>
<td>4709</td>
<td>0.89</td>
<td>1.095</td>
<td>2.930</td>
</tr>
<tr>
<td>Dropout Status (1=Dropout: based on enrollment and failure status)</td>
<td>4709</td>
<td>6.97</td>
<td>0.656</td>
<td>2.218</td>
</tr>
<tr>
<td>Child Left Behind (1=Child Left Behind; late starts, repeats, dropouts)</td>
<td>4709</td>
<td>47.87</td>
<td>0.479</td>
<td>0.500</td>
</tr>
</tbody>
</table>

Repetition and Dropout have missing observations (573, 12.16%; 312, 6.62%)
First, approximately 87 percent of population, or 4,074 out of 4,709 children show to be enrolled in primary level education. The universal nature of Indonesian primary education resonates through all grades of primary level schooling, as evidenced by the lack of repetition and minimal dropout rate among this cohort of children. Less than 1 percent of our sample population has repeated a primary grade and only 7 percent have dropped out after enrollment. Though not as high as indicated by other studies, the outcome descriptions, above, confirm the state of Indonesia’s primary education as described by the background of this research—more children are enrolling and completing primary level schooling. The, more encompassing, Child Left Behind dichotomous variable has more variation in outcome.\textsuperscript{16} It not only absorbs the impact of repetition and dropout among the cohort, but also accounts for children who start their schooling late, given the proper start age of 6 or 7 or who do not start at all. The frequency of a child lagging behind in academic promotion rate, including entrance into elementary school proves to be a bit more illuminating. Nearly half of the population sample is not on track with regards to primary-level educational attainment. Before analyzing the household level reasons for this outcome, as well as delving into the potential gender gap, it is important to gain a better understanding of our sample population.

\textbf{Tables 2}, \textbf{Table 3}, and \textbf{Table 4} will facilitate the broader comprehension of the average household and average child in the sample, as they indicate the descriptive statistics for independent variables found in this research. \textbf{Table 2} denotes child related characteristics as well as controls placed in the model to offset the regional effect unobservable variables.

\textsuperscript{16} The Child Left Behind variable was constructed based on child age, child start age of elementary school, the expectation that the legal start age is actually 6 or 7, child enrollment; and whether child has ever attended school. As such, the variable represents: repeats, dropouts, late starts, and non-starts.
TABLE 2: DESCRIPTIVE STATISTICS OF INDEPENDENT CHILD-RELATED VARIABLES AND CONTROLS

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Specification</th>
<th>N</th>
<th>Percent</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Child Related Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (1=Boy)</td>
<td></td>
<td>4709</td>
<td>50.37</td>
<td>0.504</td>
<td>0.500</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>4709</td>
<td>10.044</td>
<td>2.457</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Controls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td>4709</td>
<td>6.765</td>
<td>3.382</td>
<td></td>
</tr>
<tr>
<td>1= North Sumatra</td>
<td></td>
<td></td>
<td>8.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2= West Sumatra</td>
<td></td>
<td></td>
<td>5.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3= South Sumatra</td>
<td></td>
<td></td>
<td>5.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4= Lampung</td>
<td></td>
<td></td>
<td>4.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5= Dki Jakarta</td>
<td></td>
<td></td>
<td>9.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6= West Java</td>
<td></td>
<td></td>
<td>14.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7= Central Java</td>
<td></td>
<td></td>
<td>12.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8= Yogyakarta</td>
<td></td>
<td></td>
<td>4.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9= East Java</td>
<td></td>
<td></td>
<td>13.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10= Bali</td>
<td></td>
<td></td>
<td>4.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11= West Nusa Tengara</td>
<td></td>
<td></td>
<td>6.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12= South Kalimantan</td>
<td></td>
<td></td>
<td>4.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13= South Sulawesi</td>
<td></td>
<td></td>
<td>5.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urbanization of Residence</td>
<td></td>
<td>4709</td>
<td>45.08</td>
<td>0.451</td>
<td>0.498</td>
</tr>
<tr>
<td>(1= Urban)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As we can see, 50.4 percent of the children in the model are boys. This affords us an interesting opportunity to analyze a gender effect on educational attainment for a population. The mean age of the sample is approximately 10 years. This is primarily because the sample is age-range of 6 to 15 years. While the age-range of primary education is either 6-12 or 7-13, the cohort extends to age 15 to capture children who never enrolled in primary school and those who are affected by years of repetition. Of the location-related variables, we see that approximately 40 percent of the sample reside on Java and roughly 45 percent of the population live in an urban area. These variables will potentially capture regional valuations on child educational attainment.
Table 3 illustrates the descriptive statistics of the demand-side variables of this research. Though this research will analyze the two components of the demand-side determinants—household background/composition and household wealth—as separate contributing factors of a child’s schooling, for the purposes of preliminary analysis they are found together, below.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Specification</th>
<th>N</th>
<th>Percent</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household Background and Composition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Members in Household</td>
<td>4709</td>
<td>5.607</td>
<td>1.882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion (1=Islam)</td>
<td>4709</td>
<td>86.64</td>
<td>0.866</td>
<td>0.340</td>
<td></td>
</tr>
<tr>
<td>Sex (1=Male) of Household Head</td>
<td>4709</td>
<td>89.96</td>
<td>0.900</td>
<td>0.301</td>
<td></td>
</tr>
<tr>
<td>Years of Education for HH Head</td>
<td>4709</td>
<td>5.563</td>
<td>4.204</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction: Child Gender and Education of HH Head</td>
<td>4709</td>
<td>2.794</td>
<td>4.068</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction: Child Gender and Sex of HH Head</td>
<td>4709</td>
<td>0.452</td>
<td>0.498</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Household Wealth and Economic Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Value of HH Assets (USD)</td>
<td>4709</td>
<td>7797.454</td>
<td>40202.770</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HH Use of Electricity (1=Yes)</td>
<td>4709</td>
<td>67.36</td>
<td>0.674</td>
<td>0.469</td>
<td></td>
</tr>
</tbody>
</table>

Indonesia has the largest population of Muslims in the world. This sample captures 4,080 Muslim children, which represents about 87 percent of the sample population. There is no expectation that the religion itself would in fact deter boys versus girls educational attainment on the whole, as Indonesia is believed to have a minimal gender disparity for schooling at the
primary level. However, there is a potential that religion will influence child-schooling attainment in the higher grades of primary level schooling.

Table 3 also indicates that the mean years of education obtained by the head of household is 6 years of a range of 0 to 17; however, only 10 percent of the heads of households are actually female. Therefore, this research will not be able to capture a good representation of the effect of a mother’s education on a child. In this sample he average household has 5 to 6 members, this has implications on the allocation of resources and cost-benefit decision making a household may go through in determining whether a child goes to school. This ties nicely into the economic status of households under the demand-side determinants. We see, in the above table, that the average household asset value 7,797.45 USD and that approximately 67 percent of children live in households connected to electricity. This means that the majority of our sample is of a wealth status that is connected to basic services. Moreover, while the mean asset value for a household is 7,797.45 USD the deviation is exceptionally large, at a value of 40202.77, indicating wide distribution of wealth representation in the model.

As a counterpart to the above two tables, Table 4 indicates the descriptive statistics of the research model’s supply-side determinants, giving us preliminary insight the impact of school access and quality. Access is represented by three proximity variables: access to primary schools in village, access to primary school in province, and travel time to school in minutes. School quality is captured by number of students in the school and school flooring type.

\footnote{This is the closest variable to number of siblings in household, which would have been more reflective of the model.}
Table 4 shows that 99 percent of the sample has access to a primary school on the provincial level and 82.4 percent of children have access to a primary school at the village level. These access variables reflect the Indonesian government school building initiative after oil windfalls. But does the mere existence of a school matter, in terms of educational attainment? The quality variable, included in the model, to address the impact of school quality on the supply-side of educational attainment is a dummy variable for school flooring type. One would anticipate poorer quality schools to be closer in proximity to poorer neighborhoods. The descriptive information, however, indicates that school quality is closely distributed around fair to above fair quality infrastructure. Nearly half of the population is of a community with a primary school that is of cement/red brick flooring type. Another 39 percent of schools fall in the upper tier of quality with tile/terazzo flooring (with less than 1 percent in the highest quality

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18 This research attempted to incorporate the number of students per elementary school in the model, however, there were only 1805 observations and even with the inclusion of imputed values based on community means, the variable of number of students per school was found to be insignificant.
level of ceramic/marble flooring). The, approximately, 11 percent remaining fall under the poor quality of school infrastructure (Wooden/Plank/Dirt flooring). The implications of such results may very when discussing the impact on child gender and educational attainment.

To gain a more targeted understanding of girls versus boys schooling attainment in Indonesia, both the dependent variables and key demand-side determinants have been disaggregated by gender and presented in various tables below. First, Table 5 illustrates the descriptive statistics of each of the education outcomes by child gender.

| TABLE 5: DESCRIPTIVE STATISTICS OF DEPENDENT VARIABLES DISAGGREGATED BY CHILD GENDER |
|-----------------------------------------------|--------|--------|--------|--------|
| **Enrollment (1=Attending)**                  | Gender | Frequency | Percent | Mean | Standard Deviation |
| Boys                                          | 2069   | 87.08    | 0.871   |      | 0.336              |
| Girls                                         | 2005   | 85.76    | 0.858   |      | 0.350              |
| Both                                          | 4074   | 86.42    | 1.000   |      | 0.000              |

<table>
<thead>
<tr>
<th>Repetition (1=Child Repeated at Least one Primary Grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
<tr>
<td>Both</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dropout (1=Failed and No Longer Enrolled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
<tr>
<td>Both</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child Left Behind (1=Child Behind in Primary Promotion Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
<tr>
<td>Both</td>
</tr>
</tbody>
</table>

The information found in this table illustrates the minimal gender disparity in educational attainment based on a variety of education outcomes. Not only is 86 percent of the population
enrolling with limited repetition rates and dropouts (as shown in Table 1), but also the gender related frequencies allude to an insignificant gender gap. Table 5 indicates that approximately 85.8 percent of all girls in the cohort (ages 6-15) are, in fact, enrolled in primary school as compared to the 87 percent of boys. Though the frequency of both repetitions and dropouts are minimal, both girls and boys evenly experience the outcomes, with only a 0.1 percentage point difference in repetition and a less than 1 percentage point difference in dropouts between child genders. Furthermore, while the outcome for Child Left Behind indicates that 47.8 percent of the population is actually lagging in terms of academic promotion and the female cohort seems to actually, be lagging less than its male counterpart. This is a safe assumption to make given that the sample is nearly a 50:50 boy-girl ratio, as indicated by Table 2. The data shows that 46.3 percent of the female population in the cohort is left behind in terms of expected grade completion (based on school start age of 6 or 7) as compared to 49.3 percent of their male counterparts. This is interesting, as we would imagine an inverse frequency relationship, given our figures on enrollment, repetition, and dropout; however, it seems that more boys are starting late or not enrolling at all as compared to girls in Indonesia, actually indicating a reverse gender gap in primary level education attainment.

The next, Table 6, disaggregates by gender, however, this time analyzing key household background information. More specifically, the following table is related to the educational attainment of household head and gender of household head.
As per the results from Table 6, we can note that there is a fairly even distribution of an average, 5 to 6 years of education for household head, across both male and female children. Moreover, approximately 90 percent of the population faces a household composition with a male head. This, of course, means that the education mean would mostly be measuring the impact of male head of household on education attainment. Most literature pertaining to child schooling indicates a significant increase in the probability of child educational attainment associated with an increase in parental education levels (see Lillard & Willis, 1994; Glewwe & Ilias, 1996; Tansel, 2000; Suryadarma et al., 2006; Beard, 2007). More specifically, as indicated in the literature review, there is empirical evidence that a mother and father’s education will effect the educational attainment of a child by respective gender; moreover, a mother’s education on a daughter schooling is found to be stronger (Lillard & Willis, 1994). While it was difficult to construct a parental education variable in this dataset, head of household was intended to be used as a proxy. The lack of variation in gender, however, leaves room for biased coefficients.

In the next table (Table 7) found below, there are key wealth status variables disaggregated by gender. Again, here we see a close percentage distribution among wealth
indicators across, both, populations of boys and girls. The expectation is that, all other things held constant, the better the economic standing of a household, the more incline a household would be to send its child to school; more specifically the probability of educational attainment would increase for the female population of the cohort.

<p>| TABLE 7: DESCRIPTIVE STATISTICS OF KEY INDEPENDENT WEALTH VARIABLES DISAGGREGATED BY CHILD GENDER |
|---------------------------------------------------|-------------------------------------------------|---------------------------------|---------------------|</p>
<table>
<thead>
<tr>
<th>Gender</th>
<th>Total Household Assets Value (USD)</th>
<th>Gender</th>
<th>Household Electricity Usage (1=Use)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Mean</td>
</tr>
<tr>
<td>Boys</td>
<td>2372</td>
<td>50.37</td>
<td>7099.52</td>
</tr>
<tr>
<td>Girls</td>
<td>2337</td>
<td>49.63</td>
<td>8505.85</td>
</tr>
<tr>
<td>Both</td>
<td>4709</td>
<td>100.00</td>
<td>7797.45</td>
</tr>
</tbody>
</table>

Table 7 indicates that the mean household asset value of the female cohort is, in fact, larger that the male population. This could be a central contributing factor to the increase in obtained education outcomes for girls and the reduction in gender gap in Indonesia. Furthermore, nearly 70 percent of the sample population lives in a household in which electricity is used indicating that the majority of the sample has access to basic services and technology; as a result, it is expected, that household’s would experience benefits to income and overall standard of living. Overall, it would seem that the sample population maintains the economic factors that would be conducive to the promotion of female educational attainment.\(^\text{19}\)

\(^{19}\) It is important to note that far eastern province (East Nusa Tenggara, East Timor, Maluku and Irian Jaya), which are said to be of lesser socio-economic standing were excluded for the overall IFLS sample population; as was the conflict region of Ache. Their inclusion would mostly likely redistribute the frequencies and change our understanding of Indonesia’s gender gap, accordingly.
VI. RESULTS AND ANALYSIS

The following section is the core of the research and contains the results of the regression models that were introduced and described above. Before proceeding with the analysis, two points must be made. First, due to the limited variables available in the IFLS child individual datasets, many of the explanatory as well as outcome variables were constructed and merged; therefore, there is a margin for representational error in the data.

Second, even at the very onset, it should be affirmed that educational attainment, in all forms, is quite possibly an endogenous outcome. This means that there are unobserved predictor variables represented in the error that are correlated with the values of enrollment, repetition, dropout, and child left behind. Should those unobserved factors also correlate with this models independent variables, the result will be biased estimators (leading to incorrect regression coefficients). This will likely be the case, given that the educational attainment of the head of household could, in fact, be correlated to a child-related unobservable factors captured in the error term. This includes, but is not limited to, the extent to which parental education attainment is associated with a child’s innate ability (i.e. genes) or his motivation (i.e. nurtured success).

One method to minimize the endogeneity issue, here, would be to apply a fixed-effects Logit model disaggregated by child gender using the IFLS panel data made available through Rand. However, given the span between data waves, the likelihood of measuring the same cohort of children in the eligible range of primary education (6 years) across the years is very small. Furthermore, given that limited dependent variables are mostly studied in cross-sectional form and the limited knowledge of fixed-effects models on the onset of this research, this paper restricted its scope of analysis to a single year of data.
Demand-Side Determinants

Given the binary nature of the dependent variables, a Probit functional form was utilized to run four regressions. The main advantage of applying a Probit model rather than a linear probability model (LPM), which uses standard OLS coefficient estimators, is that the former restricts the predicted values of the dependent variables to 0 and 1. This becomes essential as the coefficients in models with dichotomous dependent variables are interpreted in terms of an increase or decrease in the latent probability of success (in this case, enrollment=1, repetition=1, dropout=1, and behind=1) given a marginal increase of the explanatory variable. As such, the use of a Probit excludes meaningless coefficients that fall beyond the range of 0 to 1—coefficients that may actually be projected in LPM models.

The results of the demand-side determinants are summarized in Table 8 (page 40). It should be noted that the baseline categories represent a female child, a non-Muslim household, a rural residence, a female head of household, and a household that does not use electricity. The continuous variables in this portion of the model are: child age, number of members per household, obtained education of household head (in years), and total household asset value (USD).

Unfortunately, the coefficient of the primary independent variable of interest, child gender, is found insignificant; though the it should be noted that the signs, in all four regressions, are expected based on intuition and/or findings from the preliminary results. In this model, however, child age is highly statistically significant at the 1 percent level. With substantive effects on the predicted probability of educational attainment, child age indicates a strong negative annual effect on the latent propensity of a child to attain primary education. Though we
cannot make a substantive conclusion on the effect of child gender, the demand-side
determinants themselves have a value-added.
### TABLE 8: REGRESSION RESULTS SHOWING THE DEMAND EFFECTS ON EDUCATIONAL ATTAINMENT

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Enrollment</th>
<th>(2) Repetition</th>
<th>(3) Dropout</th>
<th>(4) Behind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Gender (1=Boy)</td>
<td>0.248</td>
<td>-0.168</td>
<td>-0.248</td>
<td>0.0600</td>
</tr>
<tr>
<td></td>
<td>(0.169)</td>
<td>(0.168)</td>
<td>(0.169)</td>
<td>(0.129)</td>
</tr>
<tr>
<td>Child Age (Years)</td>
<td>-0.185***</td>
<td>0.145***</td>
<td>0.185***</td>
<td>0.209***</td>
</tr>
<tr>
<td></td>
<td>(0.0139)</td>
<td>(0.0133)</td>
<td>(0.0139)</td>
<td>(0.00873)</td>
</tr>
<tr>
<td>HH Religion (1=Islam)</td>
<td>-0.450***</td>
<td>0.358***</td>
<td>0.450***</td>
<td>0.0717</td>
</tr>
<tr>
<td></td>
<td>(0.124)</td>
<td>(0.124)</td>
<td>(0.124)</td>
<td>(0.0713)</td>
</tr>
<tr>
<td>Number of Members in HH</td>
<td>0.00647</td>
<td>0.0119</td>
<td>-0.00647</td>
<td>0.0256**</td>
</tr>
<tr>
<td></td>
<td>(0.0162)</td>
<td>(0.0160)</td>
<td>(0.0162)</td>
<td>(0.0109)</td>
</tr>
<tr>
<td>Urbanization of Residence (1=Urban)</td>
<td>0.0871</td>
<td>-0.0271</td>
<td>-0.0871</td>
<td>-0.0816*</td>
</tr>
<tr>
<td></td>
<td>(0.0726)</td>
<td>(0.0720)</td>
<td>(0.0726)</td>
<td>(0.0476)</td>
</tr>
<tr>
<td>Sex of HH Head (1=Male)</td>
<td>0.215*</td>
<td>-0.244*</td>
<td>-0.215*</td>
<td>-0.0926</td>
</tr>
<tr>
<td></td>
<td>(0.128)</td>
<td>(0.128)</td>
<td>(0.128)</td>
<td>(0.0966)</td>
</tr>
<tr>
<td>HH Head Years of Education</td>
<td>0.0532***</td>
<td>-0.0464***</td>
<td>-0.0532***</td>
<td>-0.0523***</td>
</tr>
<tr>
<td></td>
<td>(0.0115)</td>
<td>(0.0113)</td>
<td>(0.0115)</td>
<td>(0.00722)</td>
</tr>
<tr>
<td>Interaction: Child Gender*Education of Head</td>
<td>-0.0144</td>
<td>-0.00211</td>
<td>0.0144</td>
<td>0.00849</td>
</tr>
<tr>
<td></td>
<td>(0.0157)</td>
<td>(0.0159)</td>
<td>(0.0157)</td>
<td>(0.00956)</td>
</tr>
<tr>
<td>Interaction: Child Gender* Sex of Head</td>
<td>-0.0810</td>
<td>0.0744</td>
<td>0.0810</td>
<td>-0.0305</td>
</tr>
<tr>
<td></td>
<td>(0.178)</td>
<td>(0.176)</td>
<td>(0.178)</td>
<td>(0.132)</td>
</tr>
<tr>
<td>Total Value of HH Assets (USD)</td>
<td>-5.70e-07</td>
<td>-7.77e-07</td>
<td>5.70e-07</td>
<td>7.18e-07</td>
</tr>
<tr>
<td></td>
<td>(8.19e-07)</td>
<td>(1.16e-06)</td>
<td>(8.19e-07)</td>
<td>(4.76e-07)</td>
</tr>
<tr>
<td>HH Access to Electricity (1=Use)</td>
<td>0.335***</td>
<td>-0.240***</td>
<td>-0.335***</td>
<td>-0.269***</td>
</tr>
<tr>
<td></td>
<td>(0.0694)</td>
<td>(0.0694)</td>
<td>(0.0694)</td>
<td>(0.0499)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.305</td>
<td>0.230</td>
<td>-0.305</td>
<td>-1.421***</td>
</tr>
<tr>
<td></td>
<td>(0.369)</td>
<td>(0.357)</td>
<td>(0.369)</td>
<td>(0.258)</td>
</tr>
</tbody>
</table>

Note: 4709 observations; Absolute value of the z statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1; the regression also accounted for variances across regions by including province variables, the coefficients of which are not included in the table; this regression also accounted for supply-side determinants, the coefficients for which are found in Table 9. This model was computed using the STATA software package, using the command Probit, which automatically computes changes in predicted probabilities give a marginal change in the explanatory variables, all else held constant.
First of all, the years of education for a household head is found statistically significant at the 1 percent level for all four representations of educational attainment; moreover, the direction of the relationship between head of household education and the various education outcomes is intuitively expected. Thus, we are able to conclude that, given all other explanatory variables are held at their mean values, an additional year of head of household education is associated with a 5.3 percent increase of in the probability of a child being enrolled in primary school; a 4.6 percent decrease in the probability of a child repeating a primary grade level at least once; a 5.3 percent decrease in the probability of a primary grade dropout;\(^{20}\) and lastly, an additional year of head of household education is expected to decrease the probability of a child lagging behind in, overall, academic promotion by 5.2 percent.

Second, in terms of economic push factors—assets and electricity—only electricity is found highly significant at the 1 percent level with, once again, the expected directional association with the predicted probability of our outcomes. The interpretations would be as follows: all else held at mean values, a household that uses electricity, rather than not, is 33.5 percent more likely to enroll a child in elementary school; 24 percent less likely to have a child repeat a primary grade, at least once; and 26.9 percent less likely to allow a child to fall behind in academic promotion. At first glance, one might infer from the wealth results, above, that there is simply an economic threshold that impacts child educational attainment, whereby, once access to certain services are achieved, a household would be more inclined to send a child to school. However, upon further analysis we see that assets, which would reflect more of a gradation in poverty and affluence, while not statistically significant, also does not have expected signs for

\(^{20}\) While construction of the dropout, dependent variable, was constructed multiple times to try to avoid the reflection of enrollment results, due to lack of dropout frequency, dropout is actually very reflective of the non-enrolled pool of children. After this point only the coefficients for enrollment will be interpreted to avoid redundancy.
the given educational outcomes. The *a priori* intuition is that households with higher asset values would be more inclined to enroll a child in primary education, to prevent repetitions or dropouts, and to reduce the probability of a child falling behind in overall academic promotion rates. A critical explanation for this circumstance would be omitted variable bias—an unobserved predictor that is both correlated with our outcomes and household assets.

It should be noted that *Islam* is found highly statistically significant for enrollment, repetition, and, of course, dropout; furthermore, the degree of the negative impact of a Muslim household, as compared to a non-Muslim household, on child educational attainment (all else held at mean values) is extremely high. The probability of child enrollment at the primary level for a Muslim household is 45 percent less than that of a non-Muslim household and the probability that a child repeats a primary grade is 35.8 percent more, respectively. Indonesia has achieved near universal primary level education as a Muslim predominate country, yet these results show that Islam still has a high negative correlation with child educational attainment when compared to its smaller non-Muslim population.

While studies indicate a negative correlation between the share of Muslim population and educational outcomes (Suryadarma, 2009) and more specifically the discriminatory effect on girls educational attainment (Hajj & Panizza, 2006), the idea that Indonesia has nearly universal levels of primary education, as a majority Muslim nation, would indicate that such a probability magnitude is a gross overestimation. The large margin of difference between Muslim and non-Muslim populations could, in fact, be reflecting Indonesia’s income differentials across ethno-religious lines, which is not captured by our models. There is much qualitative research that notes Indonesia’s ethno-religious tensions and its roots in disparate income (see HPCR, 2002; Teik, 2004). More notably, Indonesia’s ethic Chinese population, most of which is non-Muslim,
is said to retain a disproportionate amount of wealth in the country (Teik, 2004). However, another contextual explanation to such a result could be the residual effect of Indonesia’s migration policy. Participants of the transmigration efforts were most markedly Muslim families of poor farmers (HPCR, 2002). Furthermore, by the early 1990s, Muslims became the majority in most regions of Indonesia due to government transmigration policy (HPCR, 2002). The impact of such relocation, regardless of volition, would, intuitively, reflect on child educational outcomes. Ultimately, the overestimation is caused by the bias of one, if not several, omitted variables.

**Supply-Side Determinants**

Table 9 is simply a continuation of the Probit summaries from the regression in Table 8, now indicating the supply-side determinants. There are four additional variables—three representing schooling access and one, schooling quality. Recognize that travel time to school (in minutes) is the only added continuous variable in this results section. Moreover, the baseline for the remaining indicator variables are primary schools characterized by dirt floors, no primary school located in village of residence, and no primary school located in province of residence.
<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enrollment</td>
<td>Repetition</td>
<td>Dropout</td>
<td>Behind</td>
</tr>
<tr>
<td>Child Gender (1=Boy)</td>
<td>0.248</td>
<td>-0.168</td>
<td>-0.248</td>
<td>0.0600</td>
</tr>
<tr>
<td></td>
<td>(0.169)</td>
<td>(0.168)</td>
<td>(0.169)</td>
<td>(0.129)</td>
</tr>
<tr>
<td>Child Age (Years)</td>
<td>-0.185***</td>
<td>0.145***</td>
<td>0.185***</td>
<td>0.209***</td>
</tr>
<tr>
<td></td>
<td>(0.0139)</td>
<td>(0.0133)</td>
<td>(0.0139)</td>
<td>(0.00873)</td>
</tr>
<tr>
<td>HH Religion (1=Islam)</td>
<td>-0.450***</td>
<td>0.358***</td>
<td>0.450***</td>
<td>0.0717</td>
</tr>
<tr>
<td></td>
<td>(0.124)</td>
<td>(0.124)</td>
<td>(0.124)</td>
<td>(0.0713)</td>
</tr>
<tr>
<td>School Floor Type (1=Ceramic/Marble)</td>
<td>2.367***</td>
<td>-2.214***</td>
<td>-2.367***</td>
<td>0.486*</td>
</tr>
<tr>
<td></td>
<td>(0.361)</td>
<td>(0.359)</td>
<td>(0.361)</td>
<td>(0.270)</td>
</tr>
<tr>
<td>School Floor Type (2=Tile/Terazzo)</td>
<td>2.856***</td>
<td>-2.706***</td>
<td>-2.856***</td>
<td>-0.312***</td>
</tr>
<tr>
<td></td>
<td>(0.109)</td>
<td>(0.106)</td>
<td>(0.109)</td>
<td>(0.0852)</td>
</tr>
<tr>
<td>School Floor Type (3=Cement/Red Brink)</td>
<td>2.936***</td>
<td>-2.793***</td>
<td>-2.936***</td>
<td>-0.220***</td>
</tr>
<tr>
<td></td>
<td>(0.103)</td>
<td>(0.100)</td>
<td>(0.103)</td>
<td>(0.0805)</td>
</tr>
<tr>
<td>School Floor Type (4=Wooden/Planks)</td>
<td>2.595***</td>
<td>-2.530***</td>
<td>-2.595***</td>
<td>-0.171</td>
</tr>
<tr>
<td></td>
<td>(0.243)</td>
<td>(0.242)</td>
<td>(0.243)</td>
<td>(0.189)</td>
</tr>
<tr>
<td>Travel Time to School (in Min)</td>
<td>0.000307</td>
<td>-0.000527</td>
<td>-0.000307</td>
<td>-6.88e-05</td>
</tr>
<tr>
<td></td>
<td>(0.000340)</td>
<td>(0.000391)</td>
<td>(0.000340)</td>
<td>(0.000163)</td>
</tr>
<tr>
<td>Primary School in Village of Residence (1=Yes)</td>
<td>0.256***</td>
<td>-0.121</td>
<td>-0.256***</td>
<td>0.0524</td>
</tr>
<tr>
<td></td>
<td>(0.0815)</td>
<td>(0.0835)</td>
<td>(0.0815)</td>
<td>(0.0547)</td>
</tr>
<tr>
<td>Primary School in Province of Residence (1=Yes)</td>
<td>0.0159</td>
<td>-0.332</td>
<td>-0.0159</td>
<td>-0.159</td>
</tr>
<tr>
<td></td>
<td>(0.267)</td>
<td>(0.254)</td>
<td>(0.267)</td>
<td>(0.195)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.305</td>
<td>0.230</td>
<td>-0.305</td>
<td>-1.421***</td>
</tr>
<tr>
<td></td>
<td>(0.369)</td>
<td>(0.357)</td>
<td>(0.369)</td>
<td>(0.258)</td>
</tr>
</tbody>
</table>

Note: 4709 observations; Absolute value of the z statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1; the regression also accounted for variances across regions by including province variables, the coefficients of which are not included in the table; the reference variable for school flooring type is Dirt/Other; this regression also accounted for all demand-side determinants, the coefficients for which can be found in Table 8; This model was computed using the STATA software package, using the command Probit, which automatically computes changes in predicted probabilities give a marginal change in the explanatory variables, all else held constant.
Of the access variables, a primary school presence at the village level is highly statistically significant at the 1 percent level for child enrollment attainment (and, of course, dropout). The results indicate that the probability that a child enrolls at the primary level increased by 25 percent given the presence of a primary school in the village of residence versus non. The fact that repetition and the lag of academic promotion is not statistically significant at the village level would indicate that there are specification issue with the model, whereby other causal observations are not represented.

In terms of school quality, flooring type is found to be highly statistically significant across the board of outcomes; however, the coefficient results for enrollment, repetition, and dropout are greater than one. There are two things contributing to this result. The first is the lack of variation among those particular outcome variables; the second is a misspecification of the model that is undermining the assumption of running a Probit regression. The results for child left behind do fall with in the expected parameter range, but the unexpected sign of the higher end of school flooring (ceramic/marble) also confirms an issue with omitted variable bias and overall endogeneity in our model.

The reason for the above results is not the lack of relevant data points, but rather that of a bias and precision issue. Not only are the outcome variables endogenous due to immeasurable confounding factors, but also some of our constructed independent variables might not have been the best proxies for predictors of child educational attainment. While the four regressions were found to be statistically significant, overall, with a less than 1 percent probability of chi-squared, the specification errors are overwhelming.
VII. CONCLUSION

This analysis had two, intrinsically, linked motivations. The first, to fill the gap of schooling quality assessment on educational attainment; the second, to further understand the micro-level determinants that contribute to gender differentials in educational attainment in the developing world. While international consensus has been established linking educational attainment to social welfare and the growth of human capital, actual measurement of gender gap reduction and achievement of international standards of Millennium Development Goals are sparse, if not inconsistent. Accordingly, it was the aim of this paper to bridge the divide linking household motivations and incentives to the end trajectory of near elimination of a gender gap.

Ultimately the ability of this paper to make any assertive normative policy statements is constrained by econometric problems and specification issues in the model. Issues of endogeneity and multicollinearity have induced both biased and inefficient estimators. To be sure, variables were found statistically significant across the spectrum of educational attainment variables, but to the extent that the magnitudes measure a true, or near true, association with the outcomes (where the direction mirrors intuition), this research is limited.

If we simply look at the more holistic representation of educational attainment in child left behind, we find that, where directional association meets expectations, the results are significant for child age, number of household members, urbanization of area of residence, head of household education, household electricity access, and most of the school floor (quality indicator) variables. It is safe to say that the vectors of analysis maintain significant impact on child primary educational attainment, though to determine the degree of impact between variables, this research would need to further scrutinize the constructed data and the variable
proxies used, in hopes to find a better representation of the vectors in the model and additional controls to absorb the effects of immeasurable confounding factors.

These corrections will also contribute to the actual analysis of the intergenerational causal paths towards the reduction of a gender gap in child educational attainment. While this paper lays the framework for a nuanced analysis of gender gap reduction, a more complete analysis would obviously better answer integral policy questions in the field of developing world education policy. What combination of policies may work best, given a micro-context? Who do we target and how? The answers to these questions and their precision will be based on a more robust application of this research framework—the initial stages of which may still take the form of cross-sectional analysis, but there is no question that with additional time this framework should take on the approach of panel analysis. Through the use of longitudinal information a study may begin to address the inevitable endogeneity problems that develops when discussing the latent propensity of obtaining educational attainment.
VIII. REFERENCES


Dollar, David, and Roberta Gatti. "Gender Inequality, Income, and Growth: Are Good Times
Handa, S. Raising primary school enrollment in developing countries. The relative importance


