

# Understanding the Educational Mobility of Men and Women and the Schooling Progression of Boys and Girls in the Philippines: A Regional Perspective

*Lawrence B. Dacuycuy and Connie B. Dacuycuy*



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## **Abstract**

Current global trends show that boys have consistently underperformed in the academic front, an observation that can be noted in the Philippines as well. At the national level, a clear reversal of the gender schooling gap between men and women is evident. However, patterns also reveal that there are regions in which men have comparable schooling years with women. To make sense of these patterns, there is a need to cast the analysis of human capital accumulation within an intergenerational perspective. A regional analysis is valuable since it can help in identifying areas in which an educational mobility outcome is either alarmingly low or notably high. Such information can be of great use not only in the targeting of educational investments but also in providing guidance on the design and implementation of survey instruments to collect good learning practices at home and at school. Hence, this paper adopts a cohort-based, regional perspective to trace the evolution of educational mobility among men and women. Results indicate substantial differences between sons and daughters, with daughters notably outperforming sons in terms of educational mobility and human capital accumulation. While this is the case, sons are not necessarily lagging behind, as there are regions in which sons have either achieved persistently good or markedly improved human capital outcomes.

In addition, the regional analysis of the schooling progression of boys and girls indicates substantial variation of outcomes, and maternal education appears to play an important role. While the paper is not able to provide causal evidence, results also point to the importance of family environments to ensure the education of the youth, especially boys. Consistent with policy implications derived from the literature, favorable educational mobility outcomes hinge on the availability of household resources, which can be augmented through labor force participation. This is unmistakably highlighted by the more pronounced effect of non-working/low educated mothers on the schooling progression of boys.

**Keywords:** educational mobility, schooling progression, gender, cohorts, regional, Philippines

## Table of Contents

1. Introduction .....	1
2. The 2010 CPH: Some useful patterns .....	5
2.1. Patterns of mean schooling years: National level .....	5
2.2. Patterns of mean schooling years: Regional level .....	6
3. Empirical strategy on assessing the effects of parental education on offspring’s educational outcomes .....	9
3.1 Parental education and offspring’s educational mobility: Linear Model .....	10
3.2. Parental education and children’s schooling progression: Ordered probit model .....	11
3.3. Data and issues .....	13
4. Discussion of results.....	13
4.1. Educational mobility of sons and daughters.....	13
4.2. Mobility-human capital accumulation of sons and daughters .....	16
4.3. Children’s schooling progression and parental education .....	18
5. Summary and concluding remarks.....	22
6. References .....	24
APPENDIX.....	28

### List of Figures

Figure 1: Average Educational Attainment, by sex of offspring .....	6
Figure 2: Mean educational attainment of daughters (in years).....	8
Figure 3: Mean educational attainment of sons (in years).....	8
Figure 4: Differences between sons’ and daughters’ mean educational attainment (in years) .....	9
Figure 4.1.1 Cohort - based IEE estimates: Father - son pairs .....	15
Figure 4.1.2 Cohort - based IEE estimates: Mother - son pairs .....	15
Figure 4.1.3 Cohort - based IEE estimates: Father - daughter pairs .....	15
Figure 4.1.4 Cohort - based IEE estimates: Mother - daughter pairs .....	15
Figure 4.2.1 IEE estimates against current mean schooling years, Sons .....	17
Figure 4.2.2 IEE estimates against current mean schooling years, daughters .....	18
Figure 4.3.1: Probabilities of outcomes in schooling progression: Sons .....	20
Figure 4.3.2: Probabilities of outcomes in schooling progression: Daughters .....	21

### List of Table

Table 1: Growth rates of Real Regional Gross Domestic Product (2007 - 2010) .....	7
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# Understanding the educational mobility of men and women and the schooling progression of boys and girls in the Philippines: A regional perspective

*Lawrence B. Dacuycuy and Connie B. Dacuycuy\**

## 1. Introduction

It has always been known that the state of educational attainment of children, relative to what their parents have achieved, acts as a useful indicator of mobility along the social status ladder. Behrman (2000) defines social mobility as a phenomenon that “refers to the dynamics of specific groups between periods in socioeconomic status indicators”. As societies strive to figure out how best to address mobility, persistent inequality and poverty concerns, lessons from educational mobility and human development literatures may underscore important development strategies, prescribe effective program interventions, and offer policy insights.

One of the major motivations in educational mobility research is the desire to explain the observed correlation between income inequality and intergenerational mobility amidst economic growth and reforms (Becker, Kominers, Murphy, and Spenkuch 2015; Emran and Shilpi 2012). Education has always been considered as a mechanism through which one can access opportunities especially during periods of growth. It also provides pathways through which income inequality may be mitigated, especially in the face of a persistently low human capital characterizing a disadvantaged subpopulation. Since human capital is enhanced by educational mobility, economic growth may respond to significant improvements in the educational profile of the working age population. However, economic growth may not always translate to higher social mobility, especially when the national wealth is not uniformly distributed geographically. For instance, Emran and Shilpi (2012) show that despite India’s tremendous growth brought about by economic liberalization, educational mobility has remained stagnant except for urban-based women and those in relatively wealthy states. Such relative responses and gains indeed necessitate the examination of subgroup-specific (e.g. by region, gender) outcomes.

Focusing on subgroups, recent trends in the education front show that girls’ academic performance has outpaced that of boys’. Narayan et al (2018) document the following global trends: 1) Girls in high-income economies exhibit higher rates of tertiary education, a trend that is also observed in the developing world. 2) In absolute terms, intergenerational educational mobility is higher for girls than boys. 3) In relative terms, daughters with highly educated parents are more likely than sons to be in the top quartile of educational attainment. The likelihood of climbing out of the bottom and moving towards the top has been rising among girls relative to boys, whereas the likelihood of staying at the bottom has been falling in developing economies except in India and Nigeria, where gender gap still persists.

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In the Philippines, girls also fare better in terms of schooling outcomes. The Millennium Development Goals target ratios of girls to boys in primary, secondary, and tertiary education have all been achieved. In addition, the 2013 Functional Literacy, Education and Mass Media Survey (FLEMMS) indicates that functional literacy rate is higher for females than for males and this is observed across various age groups. Dropout rates<sup>1</sup> of girls are also lower than those of boys. Based on UNESCO's database, 12.8% and 9.45% of girls (16.85% and 15.20% of boys) dropped out of elementary education in 2014 and 2015, respectively. Meanwhile, 10.79% and 8.33% of girls (16.43% and 14.54% of boys) dropped out of secondary education, respectively.

If we are to remain true to the gender and development approach, one that seeks to ensure that both men and women equally benefit from development, it is important to investigate educational mobility through a gender lens to develop a more nuanced narrative of education policies. Doing so underscores the overlapping nature of generations and the gender roles brought about by social norms and expectations. Children today are geared toward future roles both in the household and society at large. Thus, the academic underperformance of boys (e.g. high drop-out rates) should be a source of great concern since it implies that they will lack the necessary skills to share the benefits of future economic growth. In addition, their subpar academic performance will likely be transmitted to future generations. The good academic performance of girls necessitates further inquiry as to where they can put their educational attainment into good use, in light of their moderate rate of participation in the labor market. From 1990-2017, the country saw a mere 3- percentage point increase in the labor force participation (LFP) of women and in 2017, around 41% of women are employed in the vulnerable sector.<sup>2</sup>

As an empirical contribution to the Philippine economic literature, this paper focuses on the gender and geographical dimensions of social mobility, which is relevant for several reasons. *First*, due to the importance of education<sup>3</sup>, understanding how parents' educational attainment has affected children's educational outcome may provide useful policy prescriptions pertaining to the target and timing of interventions, structure of programs, and formulation of other educational initiatives. Our paper is particularly interested in determining whether paternal and maternal human capital have significant effects on sons' and daughters' educational attainment. Differential impacts are expected because mothers allocate a significant amount of time to child rearing activities compared to fathers who continue to be perceived as breadwinners. The role of mothers is seen as critical since they provide inputs that aid children to adapt, to learn multidimensional skills, and to achieve behavioral outcomes. Francesconi and Heckman (2016) note that child development is unmistakably linked to family environments while Heckman and Mosso (2014) link human development to social mobility, explaining that family

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<sup>1</sup> Proportion of pupils from a cohort enrolled in a given grade at a given school year who are no longer enrolled in the following school year ([http://data.uis.unesco.org/OECDStat\\_Metadata/ShowMetadata.aspx?Dataset=EDULIT\\_DS&Coords=%5bEDULIT\\_IND%5d.%5bDR\\_1\\_CP%5d&ShowOnWeb=true&Lang=en](http://data.uis.unesco.org/OECDStat_Metadata/ShowMetadata.aspx?Dataset=EDULIT_DS&Coords=%5bEDULIT_IND%5d.%5bDR_1_CP%5d&ShowOnWeb=true&Lang=en)).

<sup>2</sup> As defined in an International Labour Organization (ILO) report for the Philippines in 2017, vulnerable employment pertains to self – employed and unpaid family workers.

<sup>3</sup> Schooling provides the mechanism through which intergenerational social mobility can be influenced (Behrman, Birdsall, and Szekely 1998). As noted in Becker and Tomes (1986), Azam and Bhatt (2012) and Francesconi and Heckman (2016), highly educated parents may have more resources for shaping the educational potential of their children, sustain the development of multidimensional skills through hiring of mentors, selection of better schools, and situating children in family environments where skills are honed and developed. They are likely to invest in children's human capital, provide better learning inputs, and have the capacity to create family environments that are conducive to the production of multidimensional skills. Highly educated parents also have better social networks, which may act to increase the intergenerational heritability of advantage, thereby slowing down mobility (Galiani 2010).

background and parental actions have roles to play in the development and enhancement of children's multiple skills.

In the Philippines, there are several studies that seek to measure, decompose, and explain intergenerational income elasticity (IGE) using location-specific longitudinal datasets. Using the Bukidnon Panel Survey (BPS), Bevis and Barrett (2015) establish pathways through which parental human and physical capital can affect the incomes of children and find that the effects of maternal education is much stronger than paternal education. The study also shows that incomes of daughters tend to be correlated with incomes of parents more than that of sons. Yamauchi and Tiongco (2013) establish why daughters are more educationally progressive than sons by using data from several school divisions in the Philippines. The study, guided by a game theoretic framework, shows that parents anticipate labor discrimination against women, thereby making the education of daughters more valuable.

*Second*, the paper extends the analysis by providing a regional perspective on the gender dimension of educational mobility. A regional perspective is needed because cultural differences, learning environments, norms, and practices as well as economic circumstances may have interdependent roles in determining educational outcomes. In addition, differences in barriers that limit economic opportunities may also exist in varying degrees across regions. Focusing on educational mobility across regions not only accounts for heterogeneity but more importantly, informs policy due to the observed high correlation between income and education. Accounting for gender gaps in educational mobility across regions may provide a way to interpret educational mobility within the context of social gender roles. For instance, highly urbanized regions may differ in terms of how social gender roles have evolved relative to predominantly agricultural areas. A regional analysis is valuable since it can help in identifying areas in which an educational mobility outcome is either alarmingly low or notably high. Such information can be of great use not only in the targeting of educational investments but also in providing guidance on the design and implementation of survey instruments to collect good learning practices at home and at school.<sup>4</sup>

Specifically, within each region, our paper is interested in contrasting the respective influences of maternal and paternal educational achievements on the educational attainment of children belonging to working-age and schooling-age samples. When analyzing the former, importance is given to the intergenerational educational elasticity (IEE) and for the latter, emphasis is given to the concept of schooling progression and how this relates to the mother's LFP and educational attainment. The IEE, though simply measured through regression methods, is only informative if we adopt cohort-based definitions, something that is consistent with empirical methodologies done for India, Brazil, and several African and Latin American states. Such a measure can be feasibly estimated using cross-sectional datasets, and the use of cohort-based definitions will allow one to determine whether the transmission in educational outcomes over time has remained highly persistent or not. The IEE estimate captures the variation in parents-children education and at the same time, the relative deviation in education across generations (Leone 2017).

*Third*, this study, which focuses narrowly on the intergenerational transmission of education, is seen as an opportunity to add to the growing number of relevant studies done to measure the educational impact of parents on children's outcomes within the broad context of social mobility. Focusing on the IEE, Lanzona (1998) uses the Bicol River Basin Dataset and

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<sup>4</sup> The authors acknowledge the reviewer for pointing this out.

analyzes educational mobility and how it relates to the labor market. Dacuycuy (2017) reviews important trends and issues in the analysis of social mobility and examines variations in intergenerational wage elasticity in the Philippines. The paper also examines the extent to which one observes wage penalty or wage premia, either of which is related to the effects of a father's educational attainment on the wages of sons and daughters. Our research intends to update empirical evidence that could serve as a reference for future research on intergenerational educational mobility and its correlates.

*Fourth*, this paper demonstrates the feasibility of using the Census of Population and Housing (CPH) to generate data on parent-offspring pairs and facilitate interregional comparisons. Rather than using other nationally representative data sources such as the Labor Force Survey and Annual Poverty Indicators Survey, employing the CPH is also seen as a strategy to characterize parent-offspring educational outcomes by taking advantage of its large sample size. Given this, the paper is related to several studies that focus on the empirical aspects of intergenerational educational mobility such as Azam and Bhatt (2012) who have estimated the IEE in India and Azomahou and Yitbarek (2016) who have computed the IEE measure using Sub-Saharan African data and found that countries have diverse experiences. The authors emphasize the relative influence of paternal and maternal education on children's educational attainment using ordered probit model, and uncovered evidence that point to the divergence of paternal and maternal effects.

Currently, there is no nationally representative dataset in the Philippines to create actual regional educational profiles from which, one can extract intergenerational comparisons. However, there are location-specific datasets such as the BPS and LFS/select education divisions that have been used by Bevis and Barrett (2013) and Tiongco and Yamauchi (2015), respectively. Our paper utilizes the 2010 CPH and project cohort-based estimates on educational attainment to presently defined regions to understand whether educational mobility across certain groups in the Philippines has been changing over time.

At this point, we acknowledge the various limitations of the paper, specifically, the biases that the paper is not able to address. *First*, assortative mating and ability do matter since both are associated with the observation that women with better schooling profiles tend to marry men with better schooling profiles as well. Children from households with well-educated parents usually perform well academically and are in better position to achieve better labor market outcomes.

*Second*, the construction of samples based on the co-residency requirement introduces downward bias as well (see for example, Azam and Bhatt 2012). The analysis of educational mobility requires that the data be in the form of parent-offspring pairs. Unlike datasets in developed countries, those in developing economies do not track down movements of individuals. This presents a limitation since samples belonging to the same household are the ones selected. The exclusion of offspring that have already moved out of the household and formed a new family will likely result in downward biased estimates (Azomahou and Yitbarek 2016; Azam and Bhatt 2012). The inherent bias is more evident in households with members who are still completing their studies. This bias is also likely to happen given that educated people have more tools to advance in the labor market and, hence, positively selected to migrate. In the Philippines, there are datasets of local scope, such as the BPS and the Cebu Longitudinal Health and Nutrition Survey, which tracked sons or daughters who left parental households. Since migration data are collected, these datasets provide excellent alternatives to address biases arising from co-residency restrictions.

*Third*, the bias may be compounded by parental motivations associated with intergenerational transfers that appear to be determined along gender lines. For example, Quisumbing (1994) identifies potential tradeoffs in the types of intergenerational transfers to sons and daughters in selected rural areas in the Philippines. Daughters of well-educated mothers are treated favorably in terms of inheritance of land and they are also favored by fathers in terms of education. Estudillo et al. (2001) find that intergenerational transfers to sons and daughters function to equalize their respective current and life-cycle incomes. They find that sons are preferred in terms of land inheritance while daughters receive more educational investments. Similarly, Lauby and Stark (1998), Yamauchi and Tiongco (2013), and Quisumbing and McNiven (2010) find that daughters have higher propensity to migrate and are more committed to sharing their incomes with parents.

*Fourth*, early life environments are important in explaining a variety of social outcomes, such as crime, health, education, occupation, social engagement, trust, and voting (Francesconi and Heckman 2016). However, due to data limitations, the paper is not able to control for variables associated with early childhood environments, work histories of mother, progression of children towards adolescence, and other sources of information that point to the manner of multiple skill generation/accumulation and dynamic complementarities.

Despite these limitations, this research is still a worthwhile undertaking since it generates cohort-based results that can potentially trace the evolution of IEEs across regions and identify areas for targeting educational investments and for understanding good practices at home and at school. The paper is organized as follows: Section 2 provides some patterns based on sons' and daughters' schooling years. Section 3 discusses the paper's methodology and identifies empirical issues. Section 4 discusses the results while section 5 concludes.

## **2. The 2010 CPH: Some useful patterns**

### *2.1. Patterns of mean schooling years: National level*

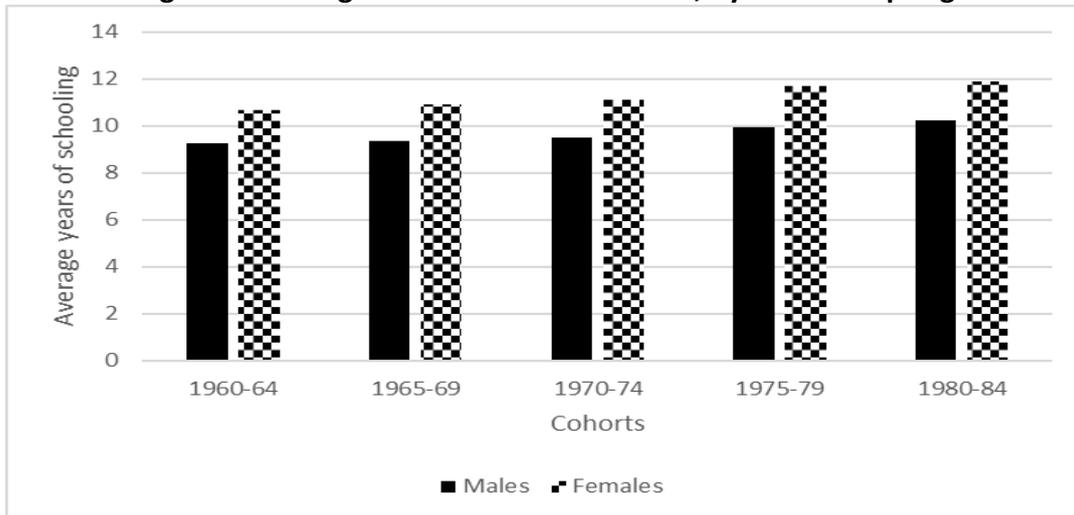
To provide estimates on the gap of mean educational attainment between male and female offspring at the national level, the 2010 CPH (Form 3, 20% sampling) is used. The CPH is undertaken by the Philippine Statistics Authority every five years to collect household data used in estimating the country's population and housing. It gathers information on the characteristics of household members such as age, sex, marital status, highest grade completed (HGC), religious affiliation, ethnicity, and disability. It also collects information on dwelling attributes such as construction materials, floor area, and year the building was built. In the 2010 CPH Form 3, data on labor market information such as occupation and class of workers are also included.

The CPH does not have information on schooling years. Therefore, data on HGC are used to generate schooling years, which is assigned 0 to those who reported no grade school completed, 1 to those who reported grade 1, and so on. The highest value of schooling years is 15, which is assigned to those who reported to have earned bachelor's degrees.

To understand intertemporal changes in educational outcomes given the limitations of a single year dataset, 5-year cohorts are defined based on the working-age population (25 years old and above). These include those born within each of the following year intervals: 1960-1964, 1965-

1969, 1970-1974, 1975-1979, and 1980-1984. Figure 1 shows that over a period spanning two decades, female offspring have better educational outcomes compared to their male counterparts. The respective male and female trends on average schooling are also increasing, albeit slowly. The gap has monotonically increased from 1960-1979 cohorts but it has narrowed within the 1980-1984 cohort.

**Figure 1: Average Educational Attainment, by sex of offspring**



Authors' computations based on the CPH 2010

## 2.2. Patterns of mean schooling years: Regional level

Cohort-based statistics are more informative and relevant at the regional level due to disparities in growth and development across regions. Table 1 shows growth rates of real Regional Gross Domestic Product. The median growth rate in 2009-2010 was 5.75%, which is lower than the national growth rate at 7.6%. High poverty incidence (above 35%) is observed in Caraga, ARMM, Zamboanga Peninsula, and Bicol. Poor regions such as Eastern Visayas, ARMM, Bicol, SOCCSKSARGEN, and Zamboanga Peninsula grew less than the median growth rate. Highly urbanized regions such as the National Capital Region (NCR), Central Luzon, and CALABARZON grew at a faster pace relative to the median growth rate. Potentially due to natural calamities, Cagayan Valley was the only region that posted negative growth in 2009. Table 1 also shows that a significant reversal occurred in 2010-2011. The median growth rate now stood at 3.25%, and almost all regions grew at a slower pace, except for Cagayan Valley, Central Luzon, Western Visayas, Central Visayas, Davao, and Caraga. ARMM was the only region to post a negative growth.

Figure 2 presents the mean schooling years of daughters across cohorts and regions. It also presents intra-regional inter-cohort variability, which measures the dispersion of estimates around the mean. There are several observations worthy of discussion.

- 1) *Daughters in Luzon regions have higher mean schooling years* relative to those in the Visayas and Mindanao regions.
- 2) *The most recent cohort of daughters (1980-1984) has the highest mean schooling years across regions.* In this cohort, daughters residing in NCR and Cordillera Administrative Region (CAR) have the highest mean schooling years at around 12.5.

- 3) *The variability of the average schooling years across cohorts is lowest in NCR. This has not been matched by any other region, indicating the region's unique experience in terms of minimizing dispersion in educational outcomes. Northern Mindanao and Caraga have low variabilities in mean schooling years across cohorts as well.*
- 4) *There is a relatively large dispersion in the mean schooling years across cohorts in Central Visayas, CAR, and MIMAROPA, with younger cohorts registering mean schooling years higher than their older counterparts.*
- 5) *Daughters in ARMM have the lowest mean schooling years and this is true across cohorts. It can be observed that the mean schooling years of the 1980-1984 cohort in ARMM (around 8.5 years) has not even matched the mean schooling years of the 1960-1964 cohort in other regions. The lowest mean schooling years of the 1960-1964 cohort is roughly 10 years. To some extent, this indicates chronic educational inequality that daughters faced in ARMM.*

**Table 1: Growth rates of Real Regional Gross Domestic Product (2007 - 2010)**

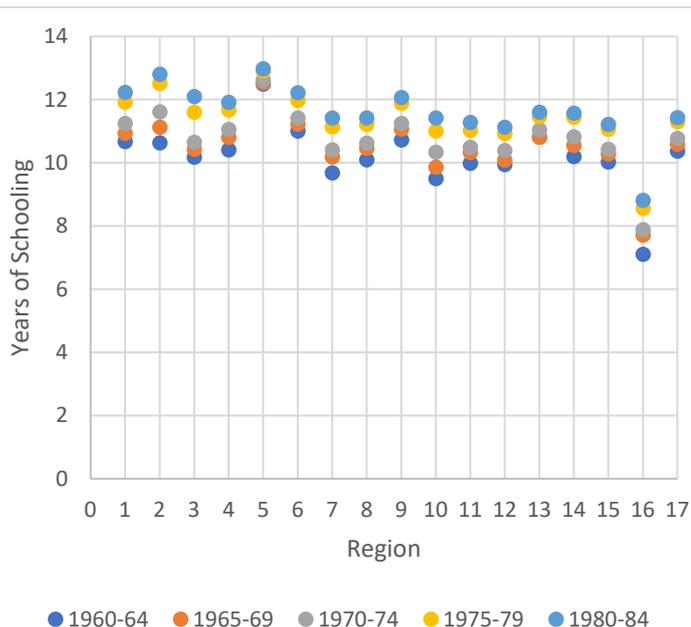
REGION / YEAR		2007-2008	2008-2009	2009-2010	2010-2011
PHILIPPINES		3.7	1.1	7.6	3.9
NCR	METRO MANILA	4.7	-0.4	7.6	3.5
CAR	CORDILLERA	1.7	2	6.3	2.1
I	ILOCOS	2	-1	7.1	3
II	CAGAYAN VALLEY	1.7	1.9	-1.1	5.4
III	CENTRAL LUZON	3.7	-1.4	10.7	7.5
IVA	CALABARZON	1.9	-1.6	11.1	2.6
IVB	MIMAROPA	3	0.8	1.1	2.5
V	BICOL	4.1	8.2	5.2	2.6
VI	WESTERN VISAYAS	4.3	5.9	3.7	5.5
VII	CENTRAL VISAYAS	3.3	0.8	12.5	7.9
VIII	EASTERN VISAYAS	3.4	1.8	2	1.8
IX	ZAMBOANGA PENINSULA	2	6.8	3.6	0.1
X	NORTHERN MINDANAO	5.2	2.9	6.9	2.5
XI	DAVAO REGION	3.7	5.4	5	4.1
XII	SOCCSKSARGEN	4.5	1.3	2	4
XIII	CARAGA	2.7	2.7	7.4	9.6
ARMM	MUSLIM MINDANAO	1.6	2.6	2.3	-1

Source: Philippine Statistics Authority (<http://nap.psa.gov.ph/grdp/2009/2009congr.asp>, accessed October 6, 2018)

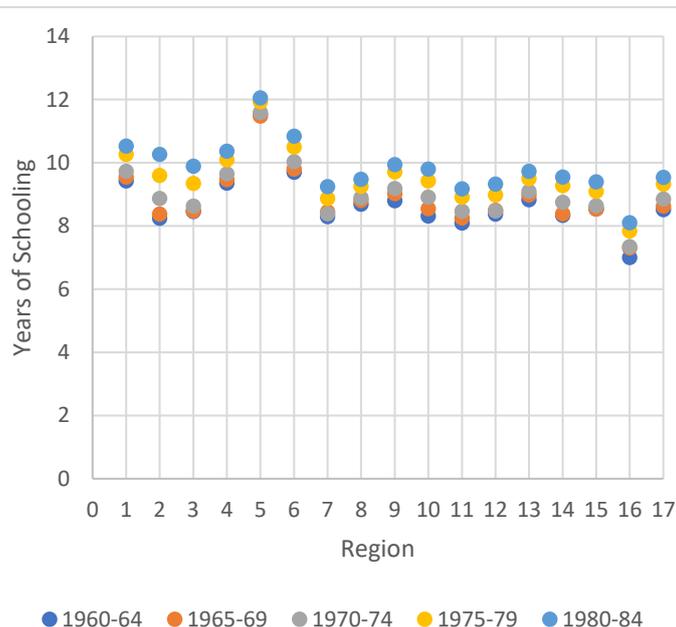
The mean and variability of sons' schooling years are presented in figure 3. There are several observations worth noting as well.

- 1) *Sons tend to have lower educational attainment relative to daughters, and this observation is consistent across regions and cohorts, with the exception of NCR in which, the mean schooling years of sons (12 years) are similar to that of daughters (12.5 years). This potentially suggests that NCR has educational opportunities that everyone enjoys and benefit from. Similar to that of daughters', the variability of average schooling years across sons' cohorts is lowest in NCR.*
- 2) *Sons residing in ARMM have the lowest mean schooling years, and this is true across cohorts. It can be observed that the mean schooling year of the 1980-1984 cohort in ARMM (around 8 years) merely matches the mean schooling years of the 1960-1964 cohort in other regions. Similar to that of daughters', this indicates chronic intergenerational educational mobility in sons within the region. In addition, while the mean schooling years of sons across cohorts are also dispersed, these are not as far apart as those observed among daughters. This implies that there are minimal improvements in mean schooling years across the generations of sons.*
- 3) *Sons residing in CAR have mean schooling years that are 2 years lower than those of sons residing in NCR. This is in sharp contrast with the relatively similar mean schooling years of daughters belonging to younger cohorts within the two regions.*

**Figure 2: Mean educational attainment of daughters (in years)**



**Figure 3: Mean educational attainment of sons (in years)**



Note: Regional residence is based on the 2010 CPH. This implies that identified cohorts of sons are assumed to have resided in regions reported in 2010. Thus, the chart shows counterfactual statistics, interpreted as the average years of schooling in prior periods given that sons have resided in 2010 identified regions.

Region Code: 1: Region I (Ilocos Region), 2: Cordillera Administrative Region (CAR), 3: Region II (Cagayan Valley), 4: Region III (Central Luzon), 5: National Capital Region, 6: Region IV-A (CALABARZON), 7: Region IV-B (MIMAROPA), 8: Region V (Bicol), 9: Region VI (Western Visayas), 10: Region VII (Central Visayas), 11: Region VIII (Eastern Visayas), 12: Region IX (Zamboanga Peninsula), 13: Region X (Northern Mindanao), 14: Region XI (Davao), 15: Region XII (SOCCSKSARGEN), 16: Autonomous Region in Muslim Mindanao, 17: Region XIII (Caraga)

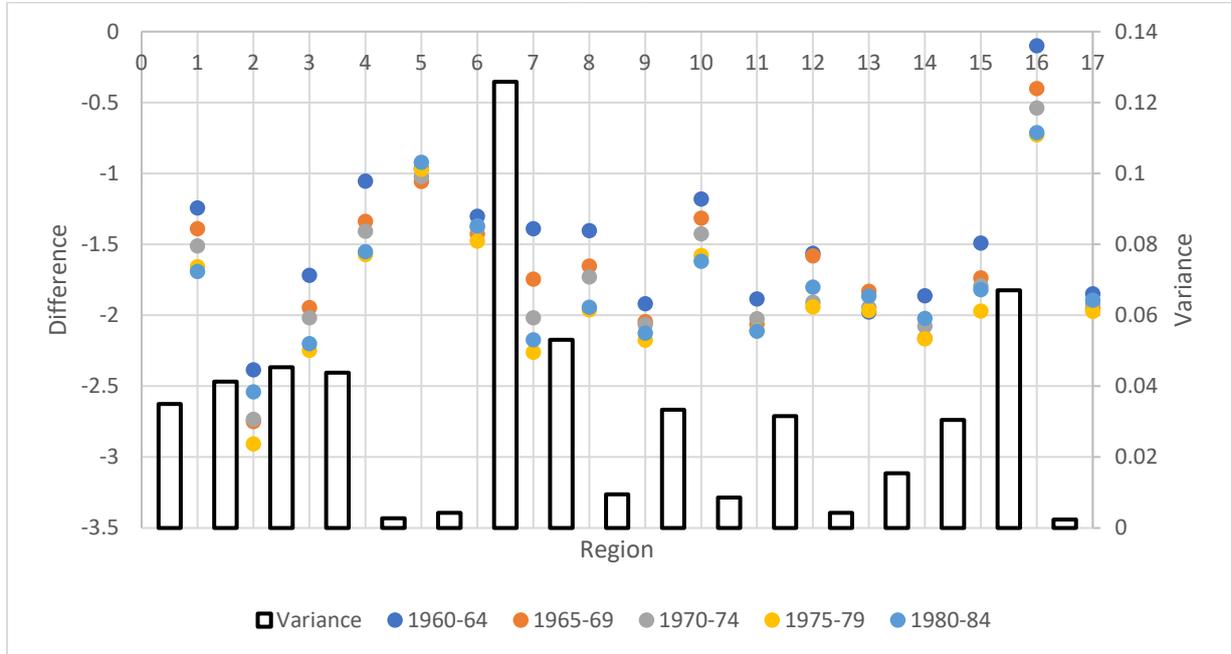
It is also informative to investigate the statistical differences between mean schooling years of sons and daughters in each region. To do this, a simple test of differences between sons' and daughters' mean schooling years is implemented across cohorts and regions<sup>5</sup>. Several observations are worth noting in figure 4.

- 1) Results confirm that, indeed, NCR has one of the lowest differentials in sons' and daughter's mean schooling years (around 1 year). The magnitude of the differential lies within a narrow band across cohorts, which is indicative of a relatively equal playing field between gender across cohorts in this region.
- 2) CALABARZON, Northern Mindanao, and Caraga also have differentials that lie within a narrow band across cohorts as well. When compared with NCR, however, these regions have higher differentials, with daughters having 2 schooling years more than sons in Northern Mindanao and Caraga. Older (younger) cohorts in CALABARZON have around 1 (1.5) years differential.
- 3) ARMM has the lowest differential (close to 0) but it has high variability across cohorts. Older cohorts in ARMM have the lowest differential while the youngest cohorts have the highest differential, indicating that even in ARMM, daughters have higher average schooling, although not as high as daughters residing in the rest of the regions.

<sup>5</sup> Results of the test are presented in table 1A in the appendix. One can readily see that across regions, the mean differences between sons' and daughters' schooling years have always been negative and significant.

- 4) CAR has the highest differential in sons' and daughters' mean schooling years. Tremendous gains for daughters are observed in 1975-1979, 1970-1974 and 1980-1984 cohorts.

**Figure 4: Differences between sons' and daughters' mean educational attainment (in years)**



Note: Regional residence is based on the 2010 CPH. This implies that identified cohorts of sons are assumed to have resided in regions reported in 2010. Thus, the chart shows counterfactual statistics, interpreted as the average years of schooling in prior periods given that sons have resided in 2010 identified regions.

Region Code: 1: Region I (Ilocos Region), 2: Cordillera Administrative Region (CAR), 3: Region II (Cagayan Valley), 4: Region III (Central Luzon), 5: National Capital Region, 6: Region IV-A (CALABARZON), 7: Region IV-B (MIMAROPA), 8: Region V (Bicol), 9: Region VI (Western Visayas), 10: Region VII (Central Visayas), 11: Region VIII (Eastern Visayas), 12: Region IX (Zamboanga Peninsula), 13: Region X (Northern Mindanao), 14: Region XI (Davao), 15: Region XII (SOCCSKSARGEN), 16: Autonomous Region in Muslim Mindanao, 17: Region XIII (Caraga)

### 3. Empirical strategy on assessing the effects of parental education on offspring's educational outcomes

Assessing the intergenerational effects of education is typically carried out using panel data. In developing economies like the Philippines, most datasets are cross-sectional in nature, and this largely explains the lack of evidence on regional educational outcomes in the country. However, recent literature has shown that the use of cross-sectional data is also acceptable as long as the information on outcomes of interest, such as the educational attainments of parents and offspring, is available. Needless to say, the data requirement itself presents some challenges, all of which are discussed in the introduction.

There are benefits from using data on schooling years for social mobility analysis. As Galiani (2007) has noted, data on intergenerational educational attainment can be reliably collected, and education has a high correlation with permanent income. Using parental education can also aid in appreciating the extent to which educational outcomes are determined by the transmission of heritable traits that translate into better labor market outcomes. More importantly, this provides measures of intergenerational persistence in education. In addition, education, when measured by years of schooling, is less likely to share the measurement errors

associated with earnings (Azam and Bhatt 2012). There will also be less life-cycle effects as individuals are most likely done with their studies by age 25.

### 3.1 Parental education and offspring's educational mobility: Linear Model

Our methodology of choice reflects well-established techniques for estimating the effects of parents' educational attainment on children's education outcomes. Whether linear or not, the anatomy of estimation strategies reveals a structure that uniformly follows a typical Markov process, thereby comparing present generation's outcomes against their immediate past counterparts. The equation of interest is given by the following:

$$s_{i,h}^c = f(s_{i,h}^p; \beta) + \epsilon_{i,h}^c \quad (1)$$

where  $s_{i,h}^c$  is the schooling achievement of the child;  $f(s_{i,h}^p; \beta)$  is a known linear function associated with parents' educational achievements,  $\beta$  is a vector of estimable parameters pertaining to parental education, the index  $h$  refers to the household to which both child and parent belong and  $\epsilon_{i,h}^c$  is an identically and independently distributed (i.i.d.) disturbance term pertaining to unobserved attributes of the child.

Following Lanzona (1998) and Dacuycuy (2017), equation (1) is expanded by considering other variables that can affect educational attainment:

$$s_{i,h}^c = f(s_{i,h}^p; \beta) + x_{i,h}^p \delta_i + x_{i,h}^c \eta_i + \epsilon_{i,h}^c \quad (2)$$

where  $x_{i,h}^p$  and  $x_{i,h}^c$  are vectors of father and child's characteristics.

When data on schooling are expressed numerically, simple regression techniques can be used. Using data on parent-child pairs, the equation identifies a measure of intergenerational educational mobility, which refers to the deviation of a child's education from its mean relative to that of the parent. The parameter vector  $\beta$  includes a population measure of persistence that indicates the effects of the parental education on the child's educational outcome. High persistence means that if the parent has low educational attainment, the child is most likely to have low educational attainment as well. To a certain extent, the addition of maternal education may mitigate the upward bias of the paternal education coefficient since mothers exert considerable effort in raising and nurturing the child. Thus, by controlling for other factors and varying maternal education, one can also have an idea how persistent maternal education is in influencing a child's educational outcome.

One advantage of the above specification is its high degree of parsimony, as it allows the examination of how robust the effects of father's and mother's education are on schooling achievements of the child. However, it may miss critical empirical characterizations if  $f(s_{i,h}^p; \beta)$  is highly nonlinear. One clear disadvantage is the fact that measures indicating maternal education may be correlated with unobserved characteristics associated with home environments (Carneiro, Meghir, and Pary 2007). This implies that the maternal effect may be upward biased, which may indicate higher correlation with offspring's achievement. Our study does not have an obvious way to resolve this, as the necessary instruments are not available in the CPH. This is a limitation that has been acknowledged at the outset.

In the earnings and wage mobility literature, the effects of paternal education on sons' educational attainments are almost always investigated. This is due to the fact that the women's LFP is affected by child birth and child care resulting in several types of bias, which includes sample selectivity. This is not a significant issue when analyzing educational mobility since women in the Philippines are relatively more educated than men and maternal education can have a significant impact on the educational outcomes of both sons and daughters. Following Lanzona (1998) and Dacuycuy (2017), the paper includes the respective ages and educational attainments (in schooling years) of fathers and mothers as part of the regressors. Household characteristics, such as the number of children, extended household indicator, household size, and the presence of an overseas Filipino worker household head are included regressors as well. For this empirical exercise, the sample is limited to working-age offspring, or those aged 25 and above.

As noted in the literature of child development, the family environment is a vital component. Though not always the case, extended households are seen to play a key role in child development. A priori, such a variable is expected to be positively correlated with the child's schooling achievements, even though more information is needed, such as the manner of interaction, human capital structure, child investment patterns, and other forms of parental or extended family inputs. Thus, it is seen as an imperfect proxy for the capacity of the household to facilitate child development. With the prevalent practice of migration in the Philippines, the inclusion of an indicator variable on migrant household head is necessary, as anecdotal evidence point to migration's disruptive effects on a child's schooling progression. This may have a negative effect on educational attainment, but with limited instruments, the effects may not be causal.

### *3.2. Parental education and children's schooling progression: Ordered probit model*

Given the marked differences in the educational outcomes between schooling-aged males and females, it is also important to establish the effect of parental education on children's schooling progression. The analysis of schooling progression allows us to determine the extent to which schooling-age children face delays, are on-time, or are advancing along the schooling ladder. Therefore, this provides more useful narratives for policies aimed at improving intergenerational educational mobility.

While there is extensive literature exploring issues in the Philippine educational system, particularly in basic education, our current interest is in determining its value within the context of social mobility. In contrast to the preceding empirical framework, which yielded counterfactual estimates, we can now have factual characterization of schooling progression of male and female offspring, conditional on known attributes such as own age, educational attainment of parents, and other household characteristics. Operating within Heckman's framework, schooling progression expresses the state of child's development which may later contribute towards social mobility (Heckman and Mosso, 2014). Within the context of human capital, the presence of highly educated parents may be correlated with better schooling progression states given that the family environment is highly correlated with maternal education as shown in Carneiro, Meghir, and Patey (2007).

Second, on a more informative platform, the paper examines how the probability associated with the highest educational attainment varies with maternal and paternal education and other factors. The interest is geared towards establishing the impact of educational attainment of

fathers and mothers, which augments studies that only focus on years of schooling as the key variable of interest.

Using a simple technique, schooling-age children can be categorized into three outcomes, namely: delayed, on-time, and advanced. A child's schooling progression is on-time if the child's HGC is grade 1 at age 7 or 8, if the child's HGC is grade 2 at age 9, and so on. A child's schooling progression is delayed if the reported HGC is lower than the preceding HGC-age pair and advanced if the reported HGC is higher.

Given that the outcomes of interest are different states of schooling progression, the ordered probit model is used, which is a suitable estimator for analyzing ordered categorical data. When a linear regression model is employed, the assumption is that the marginal effect of the schooling years of either parent is constant throughout the support. For instance, if the coefficient estimate is 0.3 for father's years of schooling, it is uniformly applied to different schooling progression outcomes of sons or daughters. This may run counter to the observation that having a son or daughter who has advanced along the schooling ladder may lead to higher parental utility or may enhance the transmission of parental abilities and traits.

If the observed progression outcomes are generated by an underlying latent process that may be associated with children's propensity to achieve progress, the process,  $e_i^* = x_i'\beta + \epsilon_i$ , is an underlying linear stochastic process. (unclear) Following (Greene 2003), all the possible values of a child's education can be mapped on  $e_i^*$ .

$$\begin{aligned} e_i &= \text{Delayed } e_i^* \leq 0 \\ &= \text{On time } 0 < e_i^* \leq v_1 \\ &= \text{Advanced } v_1 < e_i^* \end{aligned}$$

where  $v_1$  represents the cut-off point. For this empirical exercise, the sample is limited to offspring of schooling-age or those aged 6 to 21.

Similar to the specification above, the respective educational attainments of father and mother (in schooling years) are included as primary regressors. Based on schooling years, a categorical variable is created and assigned a value equal to 0 if the mother's HGC is at most elementary graduate, 1 if at least high school undergraduate or at most high school graduate, 2 if at least college units, and 3 if at least college graduate. A categorical variable to represent the father's educational attainment is constructed in a similar manner. Other household characteristics, such as the number of children, extended household indicator, household size, the presence of an overseas Filipino worker household head, are also included as regressors.

A dummy variable to represent working mothers is also included as a regressor. From the literature's standpoint, research on time use and home production documenting the effects of mother's labor market participation on children's outcomes abound. On the one hand, Stafford (1987) and Ruhm (2002) show that maternal employment negatively affects children's cognitive skills. On the other hand, within the context of gender identity or that sense of belongingness to a social category that prescribes behavioral norms (Akerlof and Kranton 2000; West and Zimmerman 1987), the intergenerational transmission of behavior happens because children typically pattern their behavior after their parents'. In this setting, maternal employment can be argued to positively affect the children's educational attainment through demonstration, inspiration, and aspiration.

### 3.3. *Data and issues*

This paper uses the 2010 CPH (Form 3, 20% sampling), which is collected by the Philippine Statistics Authority every 5 years to estimate the country's population. Using the CPH is a better alternative to minimize bias because of its large sample size. One important aspect of the dataset is that the design allows one to easily map educational categories to schooling years, thereby facilitating the use of regression-based methods for estimating IEEs.

Due to the absence of alternative identification schemes, the paper follows the co-residence feature to extract and form datasets consisting of parents and offspring. This may entail biases, all of which are discussed in the introduction. A temporal dimension is motivated by defining several age cohorts (1960-1964, 1965-1969, 1970-1974, 1975-1979, and 1980-1984) of offspring. This will become the basis of the regression models using the working-age sample. To constitute the parents-offspring pairs, variables that indicate the member's relationship to the household head and sex are used to separate the sons and daughters and extract parental data. These are then merged using identifiers unique to households.

The empirical exercise on intergenerational educational mobility is applied to defined cohorts of the working-age population, 25 years old and above. One limitation in the use of the CPH 2010 concerns the way cohorts have been defined in each region. This poses complications since some of the regions have not yet existed as separate political entities prior to 2010. Thus, the inferred educational policy environment is the result of a counterfactual, which may not capture the effects of urban-rural migration or inter-regional migration. One benefit of such a scheme, however, is to generate cohort-based results that can potentially trace the evolution of IEEs across regions. This is not an issue when it comes to the empirical exercise on schooling progression since the sample is limited to schooling-age children and cohorts are not used. In addition, the CPH does not collect earnings data, which may be needed to identify the impact of parental education on children's schooling achievements in a structural model (Behrman and Rosenzweig, 2002).

## 4. **Discussion of results**

### 4.1. *Educational mobility of sons and daughters*

Following the empirical strategy outlined in section 3.1, IEEs are estimated using OLS and are presented in figures 4.1.1 to 4.1.4<sup>6</sup>. IEE estimates that are lower than the IEE mean (around 0.3) are indicative of higher mobility while those higher than the mean are associated with lower mobility. Several observations are noted.

- 1) *Sons and daughters are relatively more mobile than their fathers.* Daughters belonging to the young cohort have experienced mobility gains in Cagayan Valley, MIMAROPA, Caraga, and Zamboanga Peninsula. This paved the way for daughters from the young cohort to outperform their fathers in all regions (figure 4.1.3.). There are also more regions where sons have surpassed their fathers' educational attainment than regions where sons have surpassed their mothers' educational achievement (figure 4.1.1).
- 2) *Sons and daughters have achieved high mobility across generations notably in Luzon regions.* Daughters have persistently high mobility in Ilocos Norte, Cagayan

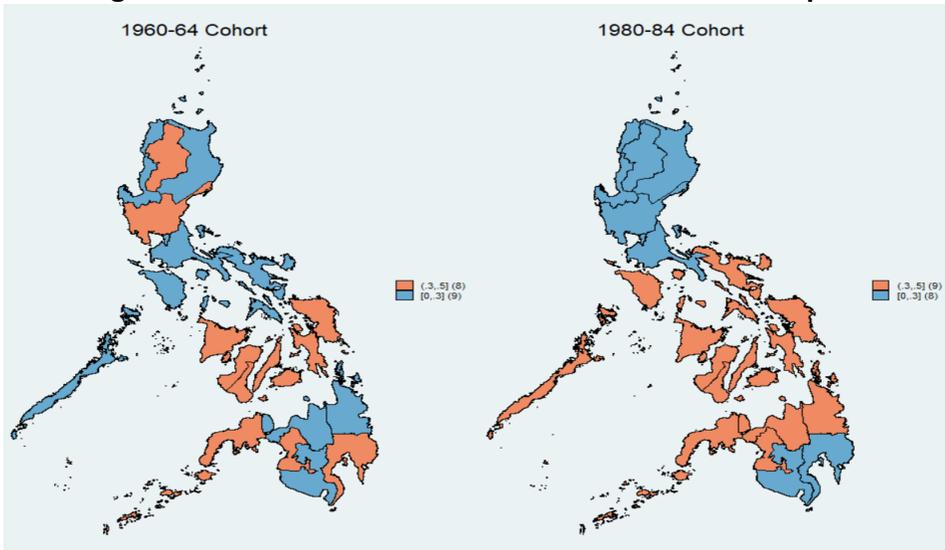
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<sup>6</sup> Regional map of the Philippines is provided in figure 1A in the appendix.

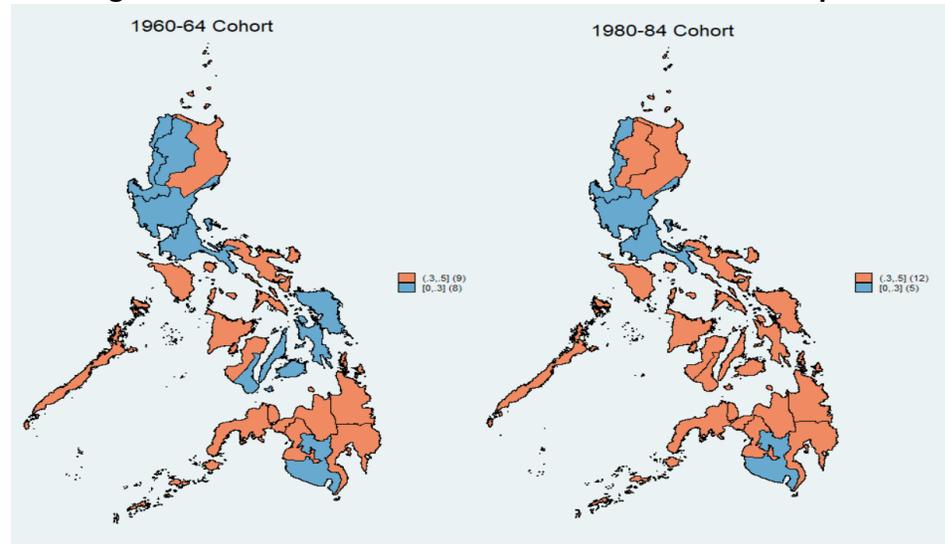
Valley, CALABARZON, MIMAROPA, Bicol, Eastern Visayas, SOCCKSARGEN, and Northern Mindanao (figure 4.1.4) while sons from young cohorts have sustained high mobility in Ilocos Norte, Central Luzon, NCR, CALABARZON, and SOCCKSARGEN (figure 4.1.2).

- 3) *Sons and daughters have low mobility across generations, notably in Mindanao and Visayas regions.* Daughters have persistently low mobility in CAR, Caraga, and Central Visayas (figure 4.1.4) while sons from young cohorts have sustained low mobility in ARMM, Zamboanga Peninsula, Caraga, and Western Visayas (figure 4.1.2)
- 4) *There are regions where sons from young cohorts have made mobility gains, notably in some Luzon and Visayas regions.* Sons have become highly mobile relative to their fathers in CAR, Cagayan Valley, and Davao (figure 4.1.1). Relative to their mothers (figure 4.1.2), the mobility of sons from young cohort are similar to that of the old cohort, except for Central and Eastern Visayas where sons from young cohort have outperformed their mothers' educational achievements.
- 5) *There are regions where sons from young cohorts have experienced deterioration in their mobility.* Sons in Northern and Central Mindanao, Caraga, MIMAROPA and Bicol have lower educational attainments relative to what their fathers have achieved (figure 4.1.1) while sons in CAR, Cagayan Valley, Eastern and Central Visayas, and Davao have lower educational attainments relative to what their mothers have attained (figure 4.1.2).

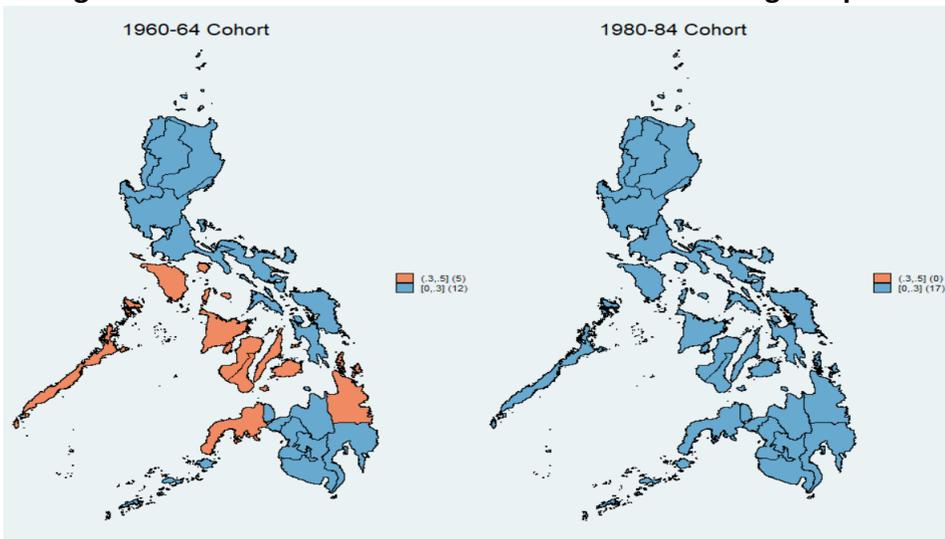
**Figure 4.1.1 Cohort - based IEE estimates: Father - son pairs**



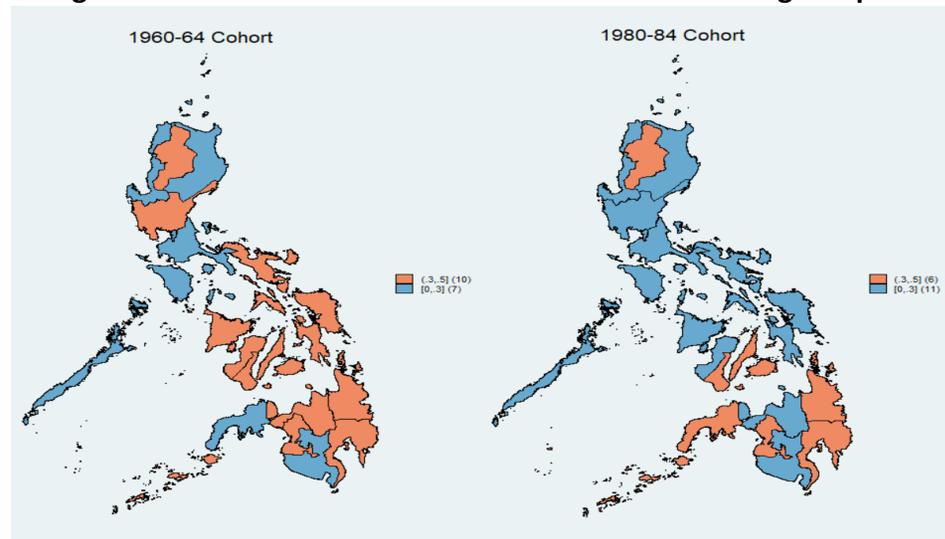
**Figure 4.1.2 Cohort - based IEE estimates: Mother - son pairs**



**Figure 4.1.3 Cohort - based IEE estimates: Father - daughter pairs**



**Figure 4.1.4 Cohort - based IEE estimates: Mother - daughter pairs**



## 4.2. Mobility-human capital accumulation of sons and daughters

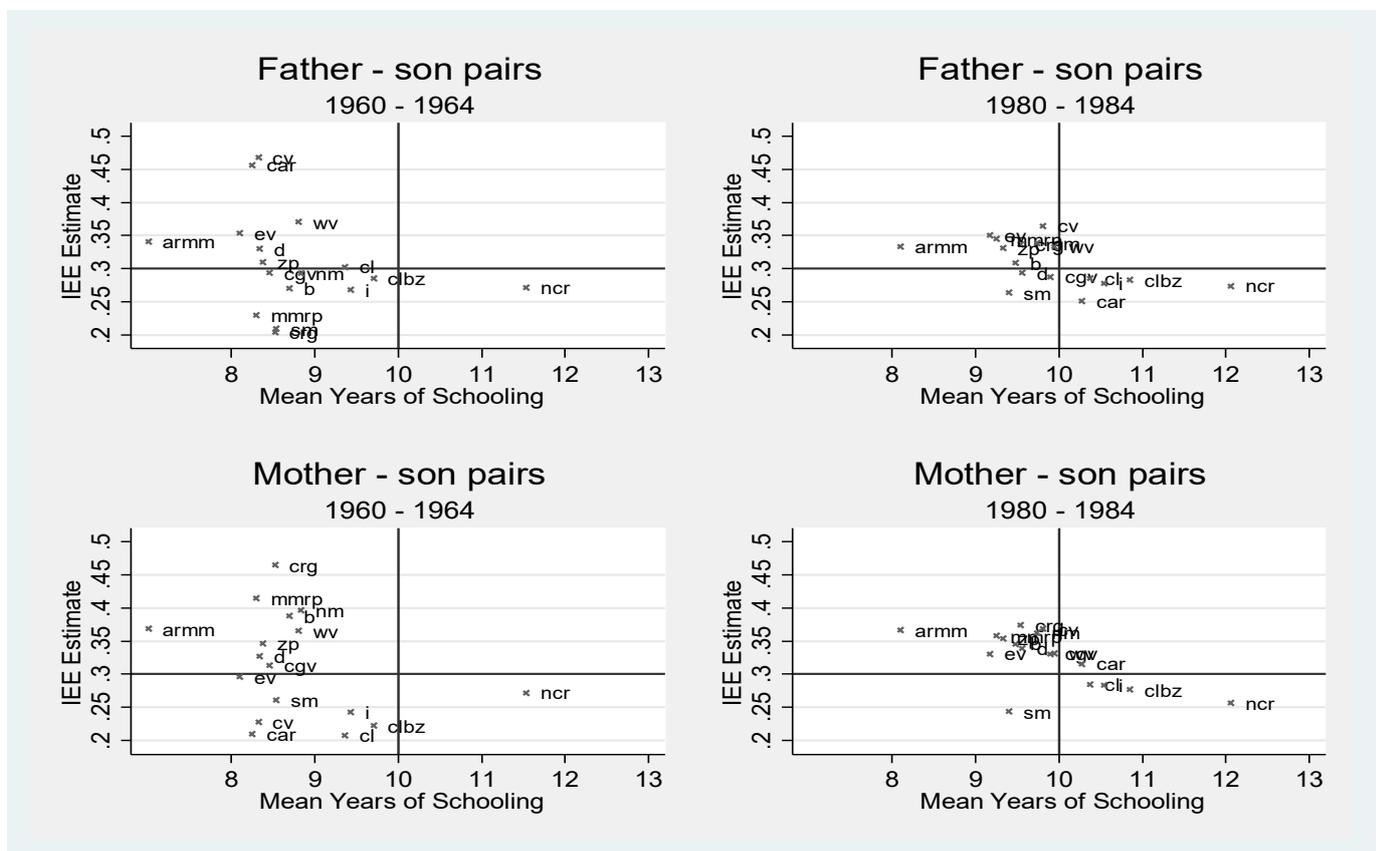
Mobility estimates contain information on the movement of offspring relative to their parents. However, immobility is not necessarily associated with suboptimal human capital accumulation for children, especially at high levels of parental educational attainment. In this case, children may be able to match parental education. This is immobility at the top. Neither is mobility immediately indicative of superior human capital outcomes for children, especially at low levels of parental educational attainment. In this case, children can easily improve upon their parents' educational attainment. This is known as mobility at the bottom. Hence, to make the IEE estimates more useful, scatterplots of the IEE estimates against the current mean schooling years are provided in figures 4.2.1 and 4.2.2.

We create a simple classification scheme based on the 10-year schooling threshold, which corresponds to the completion of secondary schooling. In terms of mobility estimates, regions with IEE estimates higher than the IEE mean have low mobility (LM). This means that the cohort's educational attainment is similar to that of cohort's parents. Those with values less than the IEE mean of 0.3 are considered highly mobile (HM). In terms of human capital accumulation, those to the left of the 10-year line are regions with currently low mean years of schooling (LS). This is the region of under-accumulation. Those to the right are regions with high mean years of schooling or accumulation (HS). There are four regions created, namely: LM-LS (regressive under-accumulation), LM-HS (regressive accumulation), HM-HS (progressive accumulation), and HM-LS (progressive under-accumulation). Several salient results are noted.

1. *Daughters in all regions, except ARMM, have experienced improvements in terms of human capital accumulation.* Daughters from the old cohort in these regions have regressive accumulation of human capital, indicating low mobility, although they have high educational attainment. Those from the young cohort have achieved progressive accumulation of human capital.
2. *Daughters in ARMM have either progressive under-accumulation or regressive under-accumulation of human capital, indicating persistently low educational outcomes across generations.*
3. *Daughters from the young cohort in NCR have the most progressive human capital accumulation.* Across generations, daughters have high educational attainment relative to their parents. Their current mean educational achievement is the highest among all the regions as well.
4. *Daughters from the young cohort in CAR have regressive accumulation.* This indicates high educational outcomes in CAR, so that in terms of mobility, young cohorts would need an even higher educational attainment to outperform their parents.
5. *Sons from across cohorts in some regions exhibit persistence in the human capital accumulation.*
  - In both ARMM and Zamboanga Peninsula, persistently low educational outcomes across generations are observed. Sons from the old cohort have experienced regressive under-accumulation of human capital and this is observed in young cohorts as well.
  - In SOCKSARGEN and Caraga, cohorts of sons have remained in the progressive under-accumulation region. This suggests that although sons have higher educational attainments than their parents, their educational attainment are still low and much remains to be done to improve their human capital.

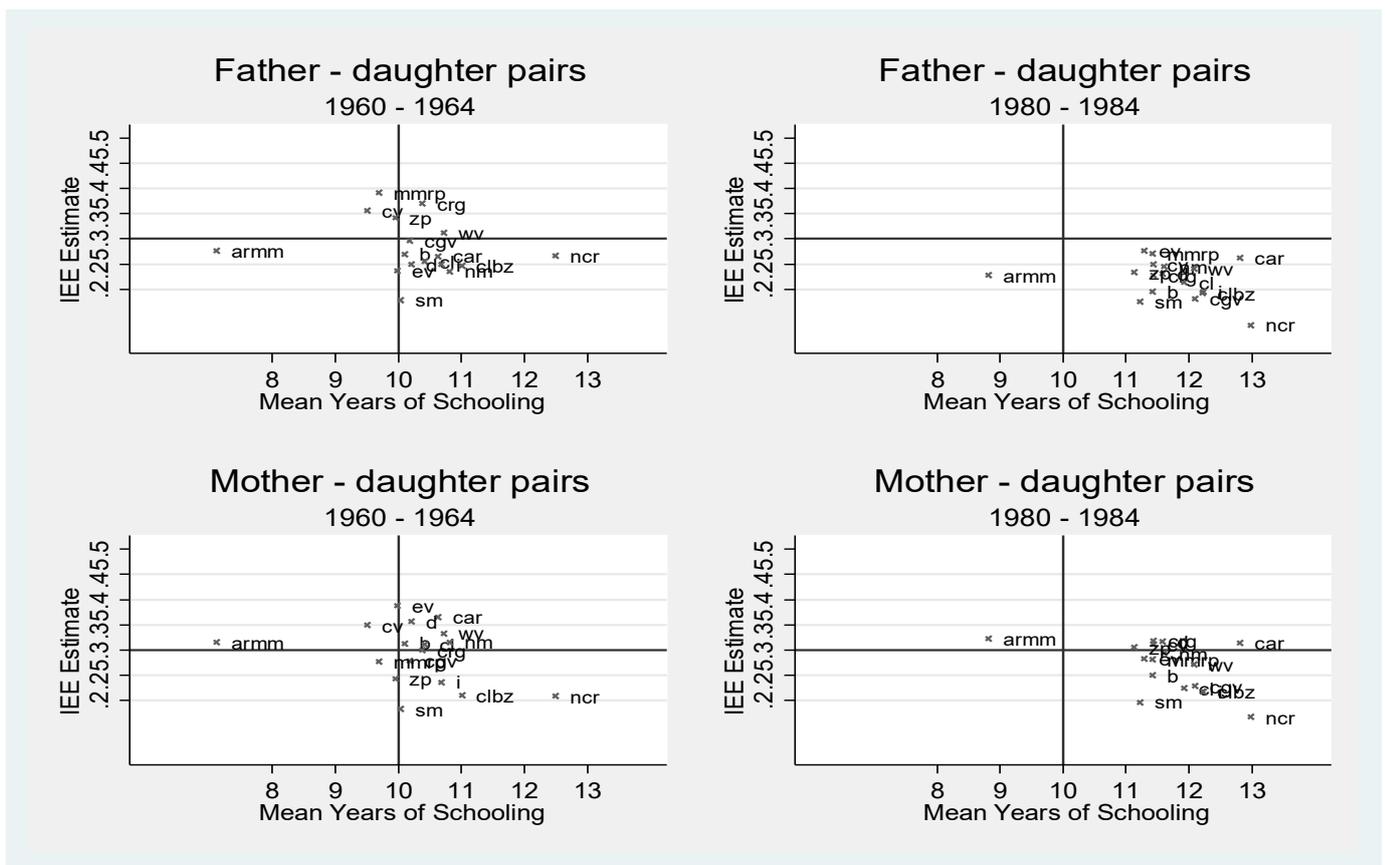
- In MIMAROPA, Bicol, and Western/Central/Eastern Visayas, sons from young cohorts have remained in the regressive under-accumulation. Much remains to be done to improve the human capital of sons in these regions as well.
  - In NCR, a progressive accumulation of human capital is observed. This means that across generations, both cohorts have high educational attainments relative to their parents.
6. *Sons in some regions show improvements in the human capital outcomes when comparing the old and young cohorts.*
- Although both cohorts of sons in Ilocos Norte, CALABARZON and Central Luzon have always been mobile, the young cohorts have higher educational attainments than their old counterparts.
  - Improvements are observed in CAR with the young cohort of sons progressively accumulating higher levels of education.

**Figure 4.2.1 IEE estimates against current mean schooling years, Sons**



i – Ilocos; car– Cordillera Administrative Region; cgv – Cagayan Valley; cl – Central Luzon; ncr – NCR; clbz – CALABARZON; mmp – MIMAROPA; b – Bicol; wv – Western Visayas; cv – Central Visayas; ev – Eastern Visayas; d – Davao; nm – Northern Mindanao; crg – Caraga; sm – SOCCSKSARGEN; zp – Zamboanga Peninsula; armm - ARMM

Figure 4.2.2 IEE estimates against current mean schooling years, daughters



i – Ilocos; car – Cordillera Administrative Region; cgv – Cagayan Valley; cl – Central Luzon; ncr – NCR; clbz – CALABARZON; mmrp – MIMAROPA; b – Bicol; wv – Western Visayas; cv – Central Visayas; ev – Eastern Visayas; d – Davao; nm – Northern Mindanao; crg – Caraga; sm – SOCCSKSARGEN; zp – Zamboanga Peninsula; armm - ARMM

#### 4.3. Children’s schooling progression and parental education

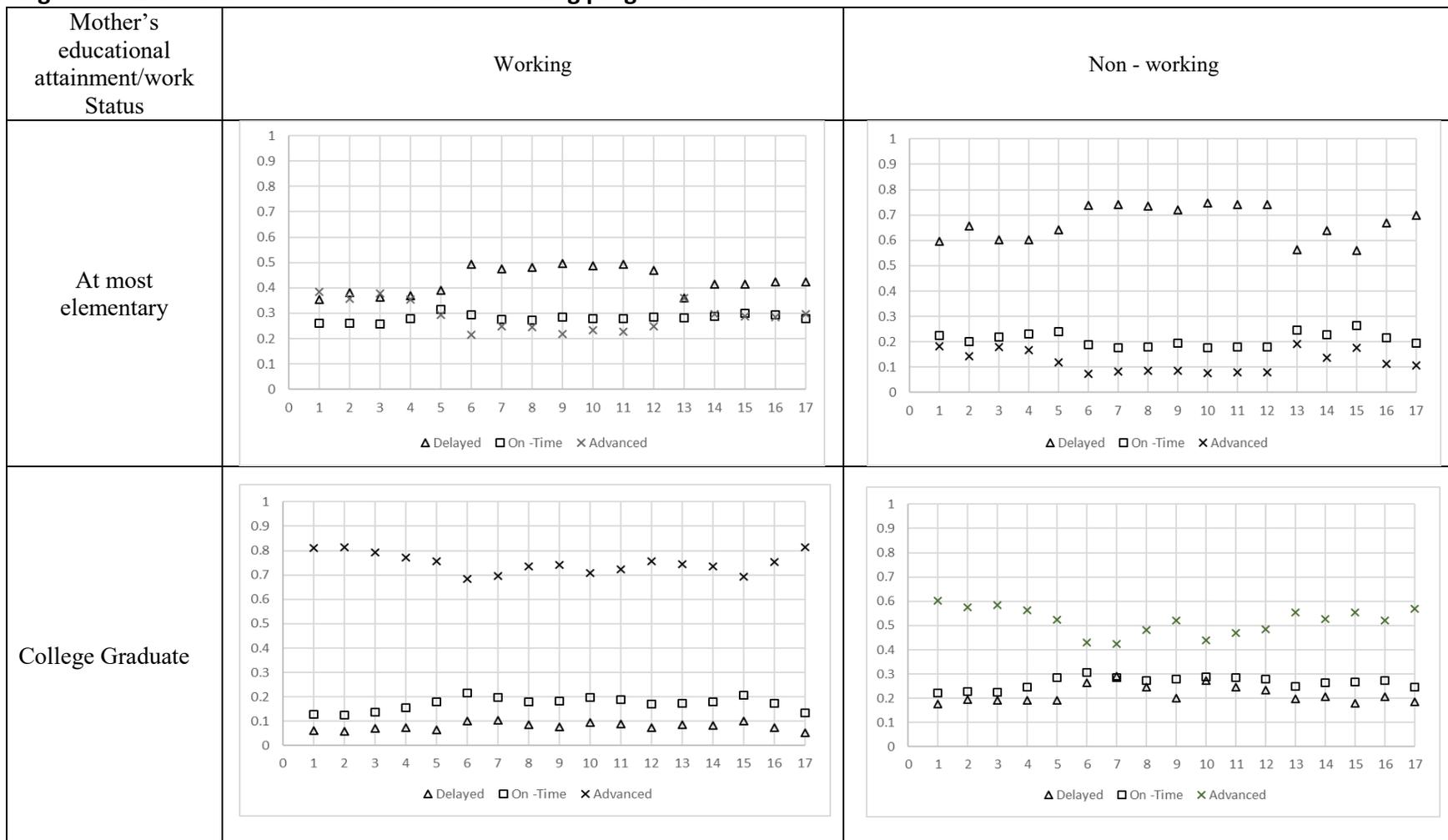
Based on the empirical strategy outlined in section 3.2 and using ordered probit models, the respective probabilities of a child’s schooling being delayed, on-time, and advanced are predicted. To do this, a benchmark household with the following characteristics is assumed: extended household, household size of 6, with 3 children younger than 7 years old. In addition, the father is assumed to be a college graduate and he belongs to a major ethnic group. To assess the contribution of mother’s education and labor market participation, predicted probabilities are computed using various assumptions on mother’s HGC and labor market status. Several results are noted for sons’ schooling outcomes.

1) *The educational attainment of mothers has an important role in determining sons’ schooling outcomes.*

- Results (upper and lower left panel of figure 4.3.1) show that sons whose mothers are working and educated are highly likely in achieving advanced schooling (between 68% and 81%), the highest of which are in Ilocos, CAR, and Caraga and the lowest of which are in MIMAROPA, CALABARZON, and SOCCKSARGEN.
- Sons whose mothers are working and less educated are more likely to be delayed in schooling, and this is evident in all Visayas regions and some Luzon regions such as MIMAROPA, CALABARZON, and Bicol.

- Similarly, results (upper and lower right panel of figure 5) show that sons of non-working and educated mothers have relatively high probabilities of advanced schooling.
  - Those whose mothers are non-working and less educated have high probabilities of delayed schooling (between 55% and 75%), with sons in Visayas regions and some Luzon regions such as MIMAROPA, CALABARZON, and Bicol having the highest probability of delay.
- 2) *The LFP of mothers has an important role on sons' schooling outcomes.*
- Results (lower left versus lower right panel of figure 4.3.1) show that sons whose mothers are working and educated have higher probabilities of advanced schooling (between 68% and 81%) than those whose mothers are non-working and educated (between 42% and 61%).
  - In addition, results (upper left versus upper right panel of figure 5) show that sons whose mothers are non-working and less educated have higher probabilities of delayed schooling (between 55% and 72%) than those whose mothers are working and less-educated (between 35% to 50%).
- 3) *The LFP of mothers plays a role in determining daughters' schooling outcomes (lower left and right panel of figure 4.3.2) and it appears that it has a higher effect on daughters' than on sons' schooling progression outcomes, with the former consistently having higher probabilities of advanced schooling across most regions. Unlike sons, daughters whose mothers are less educated have probabilities of advanced schooling higher than the probabilities of being on-time or delayed and this is observed in most Luzon and Visayas regions.*

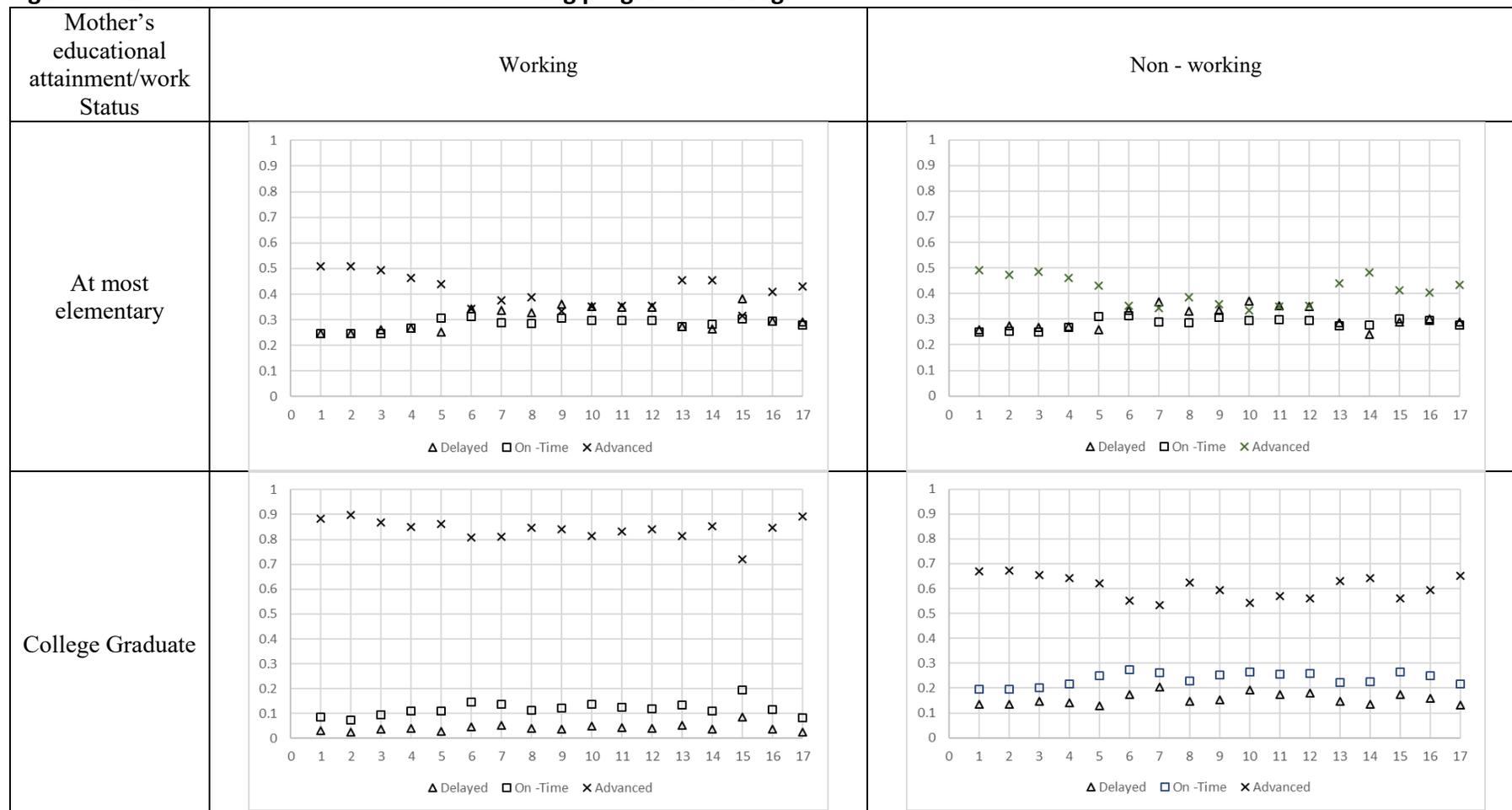
**Figure 4.3.1: Probabilities of outcomes in schooling progression: Sons**



Note: Ordered probit is used to estimate the probabilities of a child's schooling progression (advanced, on-time, and delayed) using region-specific samples. Regressors include educational dummies for mothers and fathers, an indicator variable for extended households, work indicator for mothers, age of father, an indicator variable for having an OFW household head, household size, and the number of children. The age of mother has been dropped because of its high correlation with work indicator. Stata's *margins* command is used to generate probabilities.

Region Code: 1: Region I (Ilocos Region), 2: Cordillera Administrative Region (CAR), 3: Region II (Cagayan Valley), 4: Region III (Central Luzon), 5: National Capital Region, 6: Region IV-A (CALABARZON), 7: Region IV-B (MIMAROPA), 8: Region V (Bicol), 9: Region VI (Western Visayas), 10: Region VII (Central Visayas), 11: Region VIII (Eastern Visayas), 12: Region IX (Zamboanga Peninsula), 13: Region X (Northern Mindanao), 14: Region XI (Davao), 15: Region XII (SOCCSKSARGEN), 16: Autonomous Region in Muslim Mindanao, 17: Region XIII (Caraga)

**Figure 4.3.2: Probabilities of outcomes in schooling progression: Daughters**



Note: Ordered probit is used to estimate the probabilities of a child's schooling progression (advanced, on-time, and delayed) using region-specific samples. Regressors include educational dummies for mothers and fathers, an indicator variable for extended households, work indicator for mothers, age of father, an indicator variable for having an OFW household head, household size, and the number of children. The age of mother has been dropped because of its high correlation with work indicator. Stata's *margins* command is used to generate probabilities.

Region Code: 1: Region I (Ilocos Region), 2: Cordillera Administrative Region (CAR), 3: Region II (Cagayan Valley), 4: Region III (Central Luzon), 5: National Capital Region, 6: Region IV-A (CALABARZON), 7: Region IV-B (MIMAROPA), 8: Region V (Bicol), 9: Region VI (Western Visayas), 10: Region VII (Central Visayas), 11: Region VIII (Eastern Visayas), 12: Region IX (Zamboanga Peninsula), 13: Region X (Northern Mindanao), 14: Region XI (Davao), 15: Region XII (SOCCSKSARGEN), 16: Autonomous Region in Muslim Mindanao, 17: Region XIII (Caraga)

## 5. Summary and concluding remarks

This paper has analyzed the effects of maternal and paternal schooling achievements on sons' and daughters' human capital outcomes. Using working-age samples, it has analyzed the IEEs of men and women. Using schooling-age samples, it has analyzed the schooling progression of boys and girls. Due to data limitations, however, the paper is not able to address biases arising from assortative mating and co-residency. In addition, the paper is not able to control for other attributes that could shape the family environment, identify work-nurture tensions that determine the pattern of time allocation among working mothers at different stages of a child's development, and incorporate interaction dynamics that take place within the family in terms of learning and other formative activities. In addition, our approach assumes that one can meaningfully discern critical inputs based on parents' educational attainment. Despite these limitations, results on educational mobility and schooling progression generate important insights that future research can build on.

***While broad patterns at the national level show that the mean schooling years of daughters are higher across cohorts, regional patterns reveal the need for a much more nuanced analysis.*** NCR appears to be a special case since this region exhibits the lowest variability in mean schooling years of daughters across cohorts and regions. In addition, it is the only region where the mean schooling years of both sons and daughters are relatively the same. At the other extreme, sons and daughters in ARMM have the lowest mean schooling years across cohorts. In addition, daughters in Central Visayas, CAR, and MIMAROPA exhibit the most variability in schooling years across cohorts with the younger ones registering higher mean schooling years than their older counterparts.

***Analysis of intergenerational education elasticities within a regional perspective results in a nuanced understanding of the gendered disparity in educational outcomes.*** Daughters from young cohorts have been found to be mobile relative to the educational achievements of their mothers and fathers. In contrast, the mobility of sons exhibits substantial variations across regions. With respect to their fathers' educational attainment, sons have become more mobile in Luzon regions (CAR and Cagayan Valley) and less mobile in Northern and Central Mindanao, Caraga, MIMAROPA and Bicol. With respect to their mothers' educational achievement, they have become more mobile in Visayas regions (Central and Eastern Visayas) and less mobile in CAR, Cagayan Valley, Eastern and Central Visayas, and Davao.

***A regional analysis of human capital accumulation indicates substantial differences between sons and daughters, with daughters notably outperforming sons. While this is the case, sons are not necessarily lagging behind, as there are regions in which sons have either achieved persistently good or markedly improved human capital outcomes.*** The identified regions can be designated as probable targets for primary data collection to gain a full understanding of factors and processes, such as practices at home and school and socio-cultural norms and traditions, all of which can help in shaping the landscape of education policies and practices. As pointed out in the FLEMMS reports, one important reason why boys underperform is that they lose interest in learning. Primary data collection can shed light on this issue.

- ***Daughters have exhibited improvements in their mobility-educational outcomes in all regions, except in Mindanao regions such as ARMM and CAR*** where they have low human capital accumulation that is persistent across generations.
- In contrast, ***there are regions where sons have regressive under-accumulation of human capital.*** These regions are MIMAROPA, Bicol, Western/Central/Eastern

Visayas, ARMM, and Zamboanga Peninsula. In these regions, both parents and sons from old and young cohorts have low educational attainment.

- ***There are regions where sons have progressive under-accumulation of human capital.*** In SOCKSARGEN and Caraga, old and young cohorts of sons have remained in the progressive under-accumulation region, which suggests that although sons have higher educational attainment than their parents, their educational achievements are still low and much remains to be done to improve their human capital.
- ***Luzon regions show improvements in sons' human capital accumulation.*** Old and young cohorts of sons in Ilocos Norte, CALABARZON and Central Luzon have been mobile although the young cohort has higher educational attainments. Sons in CAR have progressively accumulating human capital as well.
- ***NCR has the best achievement in human capital accumulation.*** Both sons and daughters have progressive accumulation of human capital, which means that across generations, they have high educational attainments relative to their parents. Their current mean educational achievement is the highest among all the regions as well.

***Regional analysis of the schooling progression of boys and girls indicates substantial variation in outcomes and maternal education appears to play an important role.*** Sons of educated/working mothers have very high probabilities of achieving advanced schooling, the highest of which are in Ilocos, CAR, and Caraga and the lowest of which are in MIMAROPA, CALABARZON, and SOCKSARGEN. In contrast, sons of low-educated/working mothers are more likely to be delayed in schooling, and this is pronounced in all Visayas regions and some Luzon regions such as MIMAROPA, CALABARZON, and Bicol.

Given that children's schooling and labor market outcomes are linked and the mobility- income inequality relationship remains robust, this result implies that the contribution of women's education goes beyond their current generation but extends to rearing future productive citizens as well. These regions can be potential targets of in-depth studies so that a more directed set of educational policies and programs to improve the boys' schooling progression can be provided.

***In terms of schooling environments, there is a need for a more systematic research to analyze the effects of female dominance of teachers on the boys' educational performance.*** This is a recommendation shared by Paqueo and Orbeta (2019) as well. This line of thinking is supported by the growing household evidence that children will most likely pattern their aspirations and behavior after the 'same-gender' parent, which is consistent with ideas behind identity economics (Akerlof and Kranton, 2000) and gender identity (West and Zimmerman, 1987).

***In terms of household environments, parents are important actors who are instrumental in developing children's cognitive and non-cognitive skills. To enhance parental roles, early interventions enriched with home visitations, especially to disadvantaged households whose children have high probability of dropping out of school can be explored.*** Interventions that prioritize both cognitive and non-cognitive skills can lead to better labor market outcomes and even lower the incidence of other societal problems such as criminality.

***Family resources and intergenerational transfers are also important to ensure the schooling progression of the youth, especially that of the boys.*** As reviewed in the literature, we can learn from studies that highlight the role of intergenerational transfers on schooling outcomes (Estudillo et al, 2001; Quisumbing, 1994; Quisumbing and McNiven, 2010; Lauby and Stark, 1998; and Yamauchi and Tiongco, 2013). Results based on the current research show that relative to non-working/educated, sons of working/educated mothers have higher probabilities

of advanced schooling. Relative to working/low educated mothers, a more pronounced effect of non-working/low educated mothers on sons' delayed schooling is observed. This is a result that is consistent with the evidence established in India, showing that the probability of finishing tertiary education is conditioned by the father's earnings.

Facing credit constraints, poor households may only be able to infuse inferior investments in human capital and plausibly provide suboptimal parental inputs and family learning environments, thereby limiting economic opportunities of children in the labor market. Dacuycuy (2017) has shown that sons or daughters from non-poor households have higher chances of completing college education relative to their counterparts from poor households. If heritability of traits is high in such households, the effects of parents' social status may be persistent, thereby limiting educational mobility. It is, thus, important to help parents, especially those from disadvantaged backgrounds, secure decent and stable employment. Offering program interventions in disadvantaged households that improve parenting and mentoring skills can also be explored.

***While women have higher mean schooling, their LFP has been moderate. This may have consequences on the family's ability to provide more learning opportunities for children especially for boys.*** As pointed out by Behrman and Rosenzweig (2007), increases in maternal schooling may not automatically lead to positive changes in children's schooling and results of the paper point to the importance of labor force participation. Clearly, one strategy to enhance women's LFP is to address issues about the care economy and informality, which represent factors of intermittency affecting women's LFP. Safety nets that ensure safe, secure, and stable employment and a work environment that promotes a healthy work-home balance may incentivize women to stay in the labor force. Evidence already points to the positive effects of mandatory leaves on the education outcomes of children with low-educated mothers (see for example, Carneiro, Loken, and Salvanes 2010).

***Finally, there is a need to address the persistence of income inequality by ensuring that a significant portion of the population will be able to upgrade human capital.*** One way to do this is to manage the growth process and to establish sustainable sources of funds to finance education programs. An important point raised by Galiani (2007) is that social mobility gains will be realized if policies are designed in such a way that they break the dependence of an offspring's educational outcomes on family background. A clear example, but not yet present in 2010 is the free tuition law for deserving college students in state colleges and universities. This will weaken the link between initial conditions and educational opportunities of children relative to their parents. A practical issue that confronts policymakers concerns the role of differential quality between elite universities and standard ones in social mobility (Brezis and Hellier, 2016).

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## APPENDIX

**Table 1A: Test of means, difference between male and female schooling years, by cohorts**

	1960-1964	1965-1969	1970-1974	1975-1979	1980-1984
Ilocos Region	-1.243*** 0.066	-1.39*** 0.047	-1.51*** 0.035	-1.658*** 0.027	-1.692*** 0.018
Cagayan Valley	-1.718*** 0.112	-1.946*** 0.081	-2.018*** 0.058	-2.248*** 0.042	-2.201*** 0.028
Central Luzon	-1.053*** 0.051	-1.337*** 0.035	-1.408*** 0.026	-1.571*** 0.019	-1.552*** 0.013
CALABARZON	-1.302*** 0.047	-1.426*** 0.033	-1.38*** 0.025	-1.477*** 0.018	-1.368*** 0.012
MIMAROPA	-1.389*** 0.145	-1.744*** 0.033	-2.017*** 0.076	-2.261*** 0.056	-2.173*** 0.037
Bicol	-1.402*** 0.081	-1.652*** 0.033	-1.73*** 0.044	-1.961*** 0.033	-1.944*** 0.022
Western Visayas	-1.918*** 0.061	-2.045*** 0.033	-2.065*** 0.034	-2.176*** 0.025	-2.126*** 0.017
Central Visayas	-1.18*** 0.07	-1.316*** 0.033	-1.425*** 0.039	-1.579*** 0.029	-1.62*** 0.019
Eastern Visayas	-1.885*** 0.095	-2.063*** 0.033	-2.024*** 0.054	-2.108*** 0.041	-2.111*** 0.028
Zamboanga Peninsula	-1.564*** 0.141	-1.582*** 0.033	-1.908*** 0.069	-1.94*** 0.05	-1.801*** 0.033
Northern Mindanao	-1.977*** 0.102	-1.83*** 0.033	-1.944*** 0.054	-1.966*** 0.039	-1.866*** 0.026
Davao	-1.863*** 0.103	-2.162*** 0.033	-2.076*** 0.053	-2.165*** 0.038	-2.023*** 0.025
SOCCKSARGEN	-1.491*** 0.137	-1.736*** 0.033	-1.793*** 0.064	-1.971*** 0.045	-1.82*** 0.029
National Capital Region	-0.964*** 0.041	-1.056*** 0.033	-1.022*** 0.022	-0.971*** 0.016	-0.922*** 0.01
Cordillera Administrative Region	-2.384*** 0.152	-2.75*** 0.033	-2.733*** 0.081	-2.908*** 0.056	-2.54*** 0.035
Autonomous Region in Muslim Mindanao	-0.1*** 0.299	-0.402*** 0.033	-0.538*** 0.105	-0.727*** 0.071	-0.713*** 0.04
Caraga	-1.849*** 0.135	-1.953*** 0.033	-1.922*** 0.071	-1.973*** 0.052	-1.893*** 0.034

Note: For testing differences in means, Stata's *ttest* command is used. For each region, the difference between male and female offspring educational attainment (in years) is calculated. Directly below these estimates are the standard errors. \*\*\* denotes significance at the 95% and confirms the rejection of the hypothesis that both are equal. Rejection confirms the acceptance that the mean difference is negatively significant.

Figure 1A: Regional map of the Philippines



Source: <http://www.geocurrents.info/cartography/base-maps-of-the-philippines-linguistic-regional-controversies-in-the-archipelago>