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THE NON-STATE TERTIARY SECTOR AND INEQUALITIES IN TERTIARY ACCESS AND COMPLETION

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ABSTRACT

Equitable access to quality tertiary education has explicitly been incorporated into the Sustainable Development Goals (SDGs) under Target 4.3, which states that by 2030, countries commit to ensuring equal access for all women and men to affordable quality technical, vocational and tertiary education, including university. In line with these global development goals and in response to popular desires for expanded opportunity, access to tertiary education has been expanding rapidly around the world, albeit with significant variation cross-nationally.

In many countries, the growth of access to tertiary education has been accompanied by a growth in the number of private institutions, often considered an important policy option for countries to meet unmet demand for tertiary education. Enrolments in private institutions now accounts for roughly one-third of all enrolments globally. However, there is concern that the growth of private higher education, which tends to be tuition-dependent, could exacerbate inequalities in access, and a number of country-specific studies have found that private tertiary sectors cater to the wealthiest segments of their societies. There have been only a few cross-national studies of how the private sector affects inequalities in higher education attendance or completion. Moreover, national studies, which tend to rely on a single dataset or a single point in time, may not capture how inequalities change over time, in relation to system-wide expansion of access or increasing privatization. More analysis is needed to understand how the private, non-state sector, affects inequalities in tertiary education.

This report seeks to contribute to the knowledge base on cross-national trends in inequalities in tertiary education by answering two inter-related questions: 1) How large are inequalities in attendance and completion in tertiary education; and, 2) Is the size of the private tertiary sector associated with inequalities in attendance?

One of the major limitations to analyzing wealth-based inequalities in higher education cross-nationally has been a lack of comparable data that disaggregates rates of tertiary education participation and completion by demographic characteristics. Therefore, to answer these two questions, this study draws on data from the World Inequality Database in Education (WIDE) to calculate inequalities in access to higher education and their relationship with the private sector through a regression analysis of national- level data. A cleaned version of the dataset includes at least one survey from 122 countries, and at least two surveys from 103 countries. In total, the dataset has 329 surveys spanning 2002-2016. This rich dataset allows us to examine the size of wealth-based inequalities both across countries and over time, and in relation to the extent of private tertiary provision.

In the analyses, I calculate three indicators of overall inequalities in tertiary education, for both attendance and completion: the wealth parity index, the concentration index and a log odds ratio. Despite their differing calculations and interpretations, all three indicators generally show similar cross-national patterns. Additionally, because none of these indicators accounts for differences in secondary completion rates, I also decompose overall disparities in tertiary attendance into two components: a gap accounted for by differential secondary completion rates, and a gap accounted for by differential entry rates (ER) into tertiary education.

I conduct descriptive analyses and run a series of cross-sectional and fixed-effects panel regression models to examine the relationship between the private share of enrolments in a country and the extent of inequality in higher education attendance for the 18-22-year-old cohort.

The analyses point to a number of important findings. First, wealth-based inequalities in tertiary attendance and completion rates are large; indicating we are a long way from meeting the SDG goal of equality. However, across the board, the findings point to a significant expansion in access to higher education, which includes growing attendance rates among the poorest. Unsurprisingly, overall attendance and completion rates are highest among high-income countries and remain low in low-income countries. Moreover, various specifications of inequality all suggest that wealth-based inequalities are declining as overall access to tertiary increases. The one world region where this does not appear to be the case is sub-Saharan Africa, where inequalities remain both very large and quite stable.

Decomposition analyses suggest that across all countries, about 41% of the overall disparity in tertiary attendance between the wealthiest (WIQ5) and all other quintiles is due to their differential entry rates into tertiary education, while 59% is due to disparities in secondary completion rate. That said, inequalities in entry rates vary substantially across countries, and is largest in upper middle-income countries and Latin America.

Regression analyses suggest that the size of the private tertiary sector is not always related to overall inequalities, which are likely driven by many other direct factors, including unequal secondary completion rates and policies governing access to the public sector. However, the size of the private sector is consistently positively associated with inequalities in access to tertiary education in upper middle-income countries. As such, the findings suggest that when the private sector is associated with unequal entry rates to tertiary, it seems to operate by facilitating admission to tertiary education among the wealthiest quintile, relative to other groups. This is likely because middle-income countries have growing numbers of students who are both eligible for tertiary education and have disposable income to pay for access through the private sector when not accepted into the public sector.

The report concludes with recommendations for improving data collection and future research on the private sector and inequalities in tertiary education.

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1.Introduction

Participation in higher education has increased rapidly around the world over the past three decades, and much of this has occurred within the private sector (Buckner, 2017b; Levy, 2006, 2018; Marginson, 2016a; Schofer & Meyer, 2005). The assumption is that the expansion of the private sector has helped to absorb demand and expand higher education overall, and various national case studies point to evidence of this being the case (Chae & Hong, 2009). Increased access is generally lauded, as it represents greater inclusion and democratization of opportunity, and is associated with national and global development outcomes (Benavot, 1996; Boni et al., 2016; Peercy & Svenson, 2016; World Bank, 2000, 2002). In fact, equitable access to quality tertiary education, including university, has been incorporated into the global development agenda, with target 4.3 specifically referring to equitable access to "affordable, quality technical, vocational and tertiary education, including university" (United Nations General Assembly, 2015).

However, opportunities for participating in higher education are highly unequal, and the twin trends of expansion and privatization may exacerbate these inequalities, and particularly so in countries outside of Europe and North America (Ferreyra et al., 2017). Given that much of this expansion has been accommodated in the private sector, there has been less attention paid to whether expansion of a private (non-state) sector might be affecting inequalities in access. In fact, there are reasons to worry that at least in systems with low rates of participation, the expansion of higher education may exacerbate wealth-based inequalities in access by opening seats for previously excluded students from wealthy families who are more likely to be eligible and prepared for higher education (Buckner, 2013; Chae & Hong, 2009; Goyette, 2012). There is even more cause for concern when this expansion occurs largely within a tuition-dependent private sector, as families with fewer resources may not be able to afford private higher education, or may take on debt to afford private higher education.

However, empirical evidence on how the non-state sector is affecting inequality in higher education attendance and completion is lacking, in part due to a lack of data, particularly in countries outside Europe and North America. To document the extent of inequality in higher education attendance and completion, this report explores the extent of wealth-based inequalities in attendance and completion of two-years of tertiary education cross-nationally using a large sample of household surveys, covering more than 100 countries. It then examines whether enrolments in the private sector are associated with inequalities in access and attainment in higher education.

The report's major findings are that tertiary education attendance and completion is unequal, according to various measures of inequality, and that inequalities are highest in low-income countries. However, in almost every region in the world, inequalities in tertiary attendance and completion have declined over the past two decades as systems have expanded. The one exception to this trend seems to be Sub-Saharan Africa, where inequalities remain large and relatively unchanged since the early 2000s.

Secondly, the findings suggest that cross-nationally, inequalities in tertiary attendance are reflect inequalities in both secondary completion rates and inequalities in the transition to tertiary level. In every region of the world, inequalities in secondary completion rates are larger than are differences in tertiary entry rates – suggesting that much of the inequalities in higher education are determined at earlier levels of schooling. Differential secondary completion rates are particularly large in low-income countries and Sub-Saharan Africa. However, unequal transition rates to tertiary education among secondary completers account for roughly 41% of the overall inequality in tertiary attendance; disparities in entry rate are largest in middle income countries and particularly in upper-middle-income countries and in Latin America.

In examining the role of the private sector in inequalities in higher education, the report finds that in most world regions, the private share of enrolments has remained relatively stable since 2010. Drawing on data from Latin America, which includes information on the wealth composition of both the public and private sectors, the findings show that for almost every country we have data for, excepting Chile, wealthy students are more concentrated in the private sector than in the public sector, which likely reflects higher costs associated with the private sector. In general, this finding supports the idea that in Latin America, the private sector plays a role in facilitating access to wealthy students, which may perpetuate overall inequalities.

However, bivariate descriptive analysis and simulations of expansion all suggest that the relationships between private sector expansion and overall inequalities is nuanced: there is no single overarching pattern. Rather, the findings suggest that private tertiary sectors are likely playing different roles cross-nationally. When the public sector is selective, and the private sector is serving students who would not attend tertiary education otherwise, then its expansion likely plays an equalizing role. However, when it disproportionately serves wealthy students and its tuition fees may exclude those from lower-income groups, it may perpetuate or exacerbate existing inequalities in access.

That said, cross-sectional and panel regression analyses do support the idea that the private sector is associated with worsening inequalities in upper-middle-income countries, but not low-income or high-income countries. This may be because secondary completion rates are relatively high in upper-middle-income countries, and yet, when the public sector cannot absorb demand, the private sector is serving wealthy students who can afford tuition. In contrast, there is also support for the idea that in high-income countries, where high proportions of students attend tertiary education, private sector expansion may actually reduce inequalities. This is likely because it is serving low-income students who would not attend tertiary education otherwise. This finding in high-income countries may reflect the fact that low-income students and families in high-income countries have more disposable income or access to loans or bursaries to pay for low-fee private institutions than students in low- and middle-income countries.

These findings are important for understanding progress towards universal tertiary education, as they suggest that the relationship between the private sector and inequality is likely affected by many factors, including a country's secondary completion rates (i.e., eligibility), the size of the public system (i.e., capacity), the composition of the public system, tuition differentials between sectors, and the cost of tuition relative to average national incomes. At the same time, the findings do point to certain overarching patterns at the global level, and suggest that the private sector may worsen inequalities in tertiary attendance middle-income countries by first accommodating wealthy students, but, that as the overall system expands to encompass ever larger proportions of the population, it may begin to play an equalizing role.

2.Literature Review

2.1.Massification and the Growth of Private Higher Education

Over the past five decades, enrolments to tertiary education have been growing rapidly around the world (Barakat & Shields, 2019; Marginson, 2016b; Schofer & Meyer, 2005). In 2018, the global gross tertiary enrolment rate (GTER) was estimated at 38%, up from 19% in 2000, and 9.75% in 1970 (UNESCO, 2020). This dramatic increase in tertiary enrolments has raised important policy questions for governments concerning over how to structure and fund their growing higher education systems. Given the need for highly qualified teaching personnel and research facilities, higher education is typically more resource-intensive than other levels of schooling on a per student basis (Callan et al., 2008). Moreover, unlike lower levels of schooling, which has been linked to social externalities and development outcomes, many of the clearest economic and social benefits of tertiary education accrue to the individual student and family (Boarini & Strauss, 2010; Diris & Ooghe, 2018; McMahon & Walter, 2009). Moreover, access to tertiary education is unequal, as it depends on completion and success at lower levels of schooling. Therefore, it has traditionally served small cohorts of primarily urban and the relatively well-off, and this is true even in highly subsidized public sectors.

Given these realities, combined with the fact that governments face many demands on public funding, including the goal of universalizing primary and secondary completion, various studies and policy analyses have argued that increasing cost sharing in public tertiary sectors or expanding the tuition-dependent private sectors are cost-effective policies for accommodate more students in tertiary education (Bjarnason et al., 2009; Buckner, 2017a;

Johnstone & Marcucci, 2010). Private higher education expanded substantially since 1990,[1] and studies have pointed to both increasing numbers of private higher education institutions (HEIs) and increases in private sector enrolments (Buckner, 2017b; Levy, 2018). According to Levy (2018) approximately 32.9% of all students worldwide are enrolled in the private, or non-state, tertiary sector.

The growth of the private tertiary sector has been surprising in many contexts, where private higher education was previous outlawed or politically contentious (Levy, 2006). The growing presence of the private sector also reflects changing ideas about how to fund higher education. Since the mid-1980s, the entrenchment of neoliberal discourses in educational development encouraged national governments to expand private sectors (Buckner, 2017b). Similarly, studies have shown that the development agencies, such as the World Bank and IMF, encouraged a reduction in public financing of education, and particularly higher education, as part of structural adjustment policies in the 1980s (SAPs) (Carnoy, 1995; Torres, 2002; Torres & Schugurensky, 2002).

The literature on private higher education suggests that the private sector may be growing fastest among lower and middle-income countries. In an updated global profile of private higher education, Levy (2018) report that "the huge private presence and growth" his team has documented is driven primarily by growth occurring outside high-income countries (p. 708). The private share of enrolments is higher on average in low- and middle-income countries; specifically, he reports that: "while 25.2% of the developed world's (with Japan and South Korea) enrolment is in the private sector, 37.8% of the developing world's enrolment is" (p. 211). Levy (2018) argues that in many ways, the growth of private higher education in low- and middle-income countries is both a cause and result of major changes in global higher education, stating that "developing countries' growth has come disproportionately in their private sectors, in large part as rapidly rising demand for higher education outstripped governments' ability or willingness to finance it" (p. 712).

Yet, there is also significant diversity in the private share of enrolments. In fact, private tertiary enrolments are heavily concentrated in large, disproportionately privatized systems. Specifically, 40.2% of the world's enrolments in private higher education are concentrated in only three countries: the United States, Brazil and India. It is worth noting that India's surge in private higher education sector has been quite recent, as it did not have a history of established elite private universities comparable to those in the US and Brazil. He also identifies ten countries that have large, disproportionately privatized sectors: China, India, USA, Russia, Brazil, Indonesia, Japan, Iran, Turkey, and Republic of Korea. Combined, these ten countries make up 58.3% of all enrolments globally, but 69.2% of private enrolments. Of these 10 countries, seven are middle income countries, with India the only lower-middle income country (as of 2020), and China, Russia, Brazil, Indonesia (as of 2019), Iran and Turkey all classified as upper middle-income countries. In other words, the story of world's private sector is largely one of enrolments in upper-middle-income countries.

Nonetheless, there are significant differences across world regions in terms of private sector enrolments. Levy (2018) reports that Asia and Latin America are the two regions of the world where private share of enrolments are highest. In Latin America, the private share accounts for 48.8% of all enrolments and in Asia, it accounts for 42.1% of all enrolments. Other regions have lower proportions; for example, in sub-Saharan Africa (17.8%), the Arab States (17.4%), and Europe (14.9), as well as Commonwealth countries of Canada, Australia and New Zealand (10.1%) the private share accounts for less than 20% of all enrolments.

2.2.Massification, Privatization and Inequality

Despite substantial growth, access to higher education both within and between countries remains highly unequal (Marginson, 2016b). As with lower levels of education, young people from wealthier, urban regions, and those with university-educated parents tend to have higher rates of tertiary participation and completion (Andres & Pechar, 2013; Koucký et al., 2007; Krafft & Alawode, 2018; Liu et al., 2016). That said, studies examining the relationship between massification and inequality consistently find that in the long run, expansion does equalize access, by including more individuals to access higher education. However, these relationships are not necessarily linear. Studies in the sociology of education have shown that as long as there is significant unmet demand for higher

[1] There are many debates over the definition of 'private' in higher education (Marginson, 2007); in this report, I rely on the Program of Research on Private Higher Education (PROPHE) definition, which defines private as the non-state sector, which typically implies institutions not owned or funded by the government.

education, then expansion of the highest levels of the system will exacerbate inequalities in access, as those with significant financial and cultural capital are best positioned to take advantage of growth, a theory known as Maximally Maintained Inequality (Raftery & Hout, 1993; Shavit & Blossfeld, 1993). It is only once the wealthiest groups have saturated a certain level of schooling (i.e., reached a saturation point) that access to that level will trickle down to less-advantaged groups.

Yet, the role of the private sector in both facilitating expansion and in either exacerbating or reducing inequalities has received less empirical study. On one hand, we know that even within the public sector, access to higher education is highly unequal. Moreover, state-subsidized public tertiary education has tended to benefit students from urban and wealthy backgrounds, as these students typically have access to better secondary schools (Bourguignon et al., 2007; Ilie & Rose, 2018; Krafft & Alawode, 2018). In light of these known inequalities in the public sector, we might assume that the private sector, by expanding access and offering additional supply, which will then help to equalize access for those currently marginalized, namely the poor and rural. Indeed, many studies assume that private tertiary providers will play an important role in absorbing student demand not met in the public sector (Liu et al., 2016; Sanyal & Johnstone, 2011). Further, they have suggested that this could have a positive impact on inequality, as private higher education could expand access to student populations not well served by public institutions (Teixeira & Amaral, 2001), and would allow public sectors governments to strategically invest in priorities such as scholarships for needy students. Teichler (2006) has called this a division of labour between sectors, with public HEIs promoting equity, and private HEIs absorbing excess demand.

However, in practice, since the expansion of a private sector has been associated with broader discourses of neoliberal discourses of austerity, private higher education is often viewed as a form of "outsourcing" provision of tertiary education to the private sector. In fact, numerous studies have found that that in practice, the growth of private higher education is associated with a reduction of state funding to tertiary education (Chernoshtan, 2016; Lee, 2008; Ngqakayi-Motaung, 2006; Wangenge-Ouma, 2012; Zajda, 2007). If governments looking to reduce spending on tertiary education use the private sector to drive expansion, and private universities remain primarily populated by wealthy students who can afford high tuitions, then the expansion of the private sector may actually exacerbate inequalities.

Moreover, while the sociological literature suggests that inequalities in access and completion generally decline as systems expand, most studies do not take into account the different roles that the public and private sectors might play in facilitating expansion differentially. In countries where private higher education occupies an elite role, and due to high tuition or selectivity, it disproportionately serves wealthy students, then its growth may exacerbate wealth-based inequalities. In contrast, in countries where the public sector is academically selective, it is typically disproportionately filled with students from wealthier backgrounds, who have access to better secondary schools, higher cultural capital, and private tutoring that help them in the admissions process. In these contexts, the private sector may actually play a role in equalizing overall access to higher education by serving students not admitted to the public sector. It is most likely that these relationships are nuanced, and related to both the size of the public system and the extent to which it structurally advantages the wealthy, as well as the extent of differentiation in the private sector and the role it is playing in a particular context.

In one of the first major comparative studies that tests the relationship between the private sector and overall access, Shavit, Arum, and Gamoran (2007) found that countries that rely more on private financing tend to have higher rates of overall access than predominantly publicly funded systems because the expansion permitted by private financing offsets wealth-based disparities in access. However, their study focused on private financing (i.e., family contributions to tuition and fees), not the emergence or growth of a distinct private higher education sector. In a recent analysis of 24 countries, Liu, Green and Pensiero (2016) find a similar relationship between private financing and declines in inter-generational inequality of access, but their analysis relies on data from only OECD nations and again focuses on private financing, not private sector enrolments. Given the profit-motive of many new private HEIs, the growth of private HEIs could exacerbate inequalities in access more seriously than reliance on private financing that facilitates expansion in the public sector as well as the private.

A second limitation of the existing literature is that it focuses primarily on high-income countries, drawing on studies in Europe and North America. However, the private sector may play a different role in low-income and middle-income countries than it does in Europe and North America. On one hand, there have been numerous studies examining the massification of higher education in high-income countries (Marginson, 2016a, 2016b; Schofer &

Meyer, 2005), and pointing to how policy environments facilitate access for the disadvantaged (Jerrim & Vignoles, 2015). In high-income countries, a large percentages of the university-age cohort currently attends some form of tertiary education, and the availability of individual-level data often makes it possible to study not only inequalities in access, but also more fine-grained analyses of how class reproduction works through qualitative differences in selectivity of institutions and degrees (Berggren, 2008).

In contrast, there is much less literature on both access to tertiary education and inequalities in tertiary attendance and completion in low- and middle-income countries. In general, we know that differences in tertiary enrolment rates and completion are generally much larger in low- and middle-income countries than in high-income countries (Salmi & Bassett, 2014; Segrera et al., 2008; Tilak, 2015; World Bank, 2009). At the same time, access to higher education in low- and middle-income countries has been growing dramatically over the past two decades, as secondary completion rates have increased and tertiary systems have expanded. Yet, as expected, new spaces in tertiary systems are rarely equally distributed, and tend to be disproportionately occupied by those from wealthier class backgrounds and those from dominant ethnic groups (Hayden & Ly, 2015; Tilak, 2015).

Moreover, the literature on private higher education suggests that the vast majority of new private higher education institutions, particularly in low- and middle-income countries, are tuition-dependent for-profit institutions, raising concerns about whether private higher education institutions are actually expanding access overall or simply serving select populations, namely those from wealthy backgrounds who are unable to attain a place in the public sector (Ajadi 2010; Alemu 2010; Buckner 2013; Ferreira and Hill, 2008; Goyette 2012; Liu 2012; McCowan 2007; Teferra 2015; Tham 2011). Yet, the counter argument suggests that by providing an alternative for the wealthy, the private sector may effectively be freeing up capacity in the public sector for the poor. If this were the case, the private sector would be associated with expanded access for poorer populations, indirectly.

Therefore, critical unanswered questions in the literature on private higher education are: does the growth of the private higher education sector expand access to higher education for everyone, or does it expand access to only certain groups? And relatedly, how does the relationship between private sector enrolments and inequality of access change over time?

To answer these questions, we need cross-national and longitudinal data that can trace the growth of private sector higher education enrolments over time paired with good measures of inequality in access to higher education over time. However, the field has lacked reliable cross-national and longitudinal data on inequality in access to higher education by wealth or socio-economic status (Koucký et al., 2007). In addition, we need a greater focus on inequalities in higher education outside of Europe and North America, particularly in lower- and middle-income countries (Ilie & Rose, 2016). One of the major limitations with studying inequality in tertiary education in low- and middle-income countries is a lack of data. A comprehensive report on equity in higher education, conducted by the OECD, noted that, “in most countries there is a general lack of knowledge about the extent to which equity in tertiary education is a problem as a result of the lack of critical data such as the socio-economic background of students in tertiary education” (Santiago, 2008, p. 21). This lack of data is even more pronounced in most low- and middle-income countries.

In short, there is a need to understand how expansion of tertiary education and privatization affect inequality differently, depending on a country’s level of economic development. Recognizing this need, this study draws on data from the January 2019 release of the World Inequality Database in Education (WIDE) to calculate inequalities in access to higher education and their relationship with the private sector in different countries and world regions.

2.3. Indicators to Measure Tertiary Education Access

There are various ways to measure inequality in education that apply to tertiary education, including: enrolment, attendance, progression, or completion. Enrolment and attendance both focus on an individual’s participation in higher education, although they are defined and measured in different ways.

Arguably the most widely used indicator for measuring access to higher education at the national level is the gross tertiary enrolment ratio (GTER). The GTER is typically gathered and reported by national statistical agencies or Ministries using administrative data, and is publicly available through UNESCO Institute of Statistics (UIS). The GTER has numerous limitations. First, unlike at lower levels of schooling, the number of individuals who should be

considered of appropriate age for tertiary education (i.e., the denominator) is conceptually less clear. The GTER uses the cohort of individuals who are in the age cohort of five years after the end of secondary education, typically individuals aged 18-22. However, many individuals enrolled in tertiary education are older than 22, particularly when graduate level education and mature learners are included. As a result, the GTER is above 100 in many countries. Secondly, because the GTER relies on administrative data, it does not provide information on equity across different social groups (i.e., wealth or gender). Finally, because it is collected by national statistical agencies, it reflects official numbers of students enrolled, but does not capture the extent to which individuals actually attended courses or exams, in other words, individual level participation.

A second indicator for measuring higher education participation is attendance. Unlike enrolment, which relies on administrative data, attendance is typically measured at the individual level through nationally representative household surveys. Surveys typically ask heads of household whether each member of the household "attended school at any time during the school year."2 The advantage of an indicator for attendance is that it focuses on whether an individual actually went to class or sat for exams, rather than officially enrolled. However, there are limitations to the indicator as well. First, the wording of the questionnaire item means that any attendance, even for a very short duration, would qualify the individual as having attended, which would overestimate the percentage of young people who regularly attend. Second, another major limitation with household surveys is that they ask heads of household to respond on behalf of all members. The discrepancy between what heads of household know or believe to be true, and the reality of how young people spend their time, increases with age. It may be a particular problem for accurately measuring university attendance, as heads of households may assume young people are attending higher education classes, when they are not actually doing so.

However, participation is only one aspect of higher education. Progression, years completed, and graduation are also important outcomes, and may better proxy the expected economic and social impact of higher education on individuals' lives. As with participation, data on higher education completion comes from various sources, including administrative data and household surveys, and the source of data has important implications for measuring inequality. The number of tertiary graduates is available from UIS, disaggregated by gender and level of education (i.e., ISCED 5, etc.). In addition, data on the percentage of graduates in fields of study is available. This indicator is collected from national statistical agencies, and reflects official numbers of graduates. However, this indicator has numerous limitations. First, while the total number of graduates can be used to measure gender-based disparities, it cannot be used to calculate wealth-based inequalities, given the fact that administrative sources are collected at the institutional level, not the individual level. Administrative data often does not collect, or at least, does not officially report on graduates' background characteristics. Second, there are limitations with the indicator that make cross-national comparability difficult. While UIS reports on total number of graduates, this is defined by level of education (ISCED 5, etc.), not years of tertiary education completed. Moreover, this indicator is always reported as a count of the total number of graduates; unlike primary and secondary schooling, the tertiary graduation rate is not calculated. In addition, it can be difficult to make cross-national comparisons when the number of years required to complete a degree vary. For example, the graduate of a one-year ISCED 5 program is equivalent to a graduate of a two- or three-year ISCED 5 program, with no way of distinguishing them. Perhaps more problematically, a student who has completed two years of a Bachelor's degree (ISCED 6) and does not return is never captured by data on completion, even though the student has completed as many or more years of tertiary education as an ISCED 5 graduate. As a result, measuring only official graduation numbers may underestimate the amount of tertiary education among the population.

A second source of data on tertiary completion comes from the same household surveys used to calculate tertiary attendance. Household survey questionnaires typically ask about the number of years of tertiary education completed, creating an indicator that can best be understood as "years completed." The advantages of household surveys are that they are collected at the individual level, and so can be linked to household characteristics, including household wealth, which is particularly useful if students are living with their families. In addition, unlike the measure for graduates, years completed is degree-agnostic – an individual who has completed two-years of tertiary education is included in the indicator regardless of whether those two years were in an ISCED 5 or ISCED 6 program, and regardless of whether the individual is counted as having officially graduated, or not. However, one

[2] For example, the most recent DHS Questionnaire asks: "Did (NAME) attend school or any early childhood education program at any time during the [2019-2020] school year?" (See: https://dhsprogram.com/pubs/pdf/DHSQ8/DHS8_Household_QRE_EN_8Apr2020_DHSQ8.pdf)

disadvantage of these indicators is that they are still calculated for students within a particular age band, and in contexts where many students are over-age, they may undercount eventual tertiary completion rates.

In my analyses, the primary source of data on tertiary attendance and completion rates (TCR) comes from World Inequality Database on Education (WIDE), which uses household surveys to measure inequalities in education cross-nationally. Its data comes from the demographic and health surveys (DHS), multiple indicator cluster surveys (MICS), the European Union's Statistics on Income and Living Conditions (EU-SIL) and other national household surveys (UNESCO, 2015). WIDE data is publicly available and calculates various educational indicators, including tertiary attendance and completion, disaggregated by wealth income quintiles, as well as other attributes, including sub-national geographic region, gender, and language, among others. Using the household survey data available in WIDE allows us to measure inequalities in access and completion. In the analyses, I examine two indicators: tertiary attendance (18-22-year-old) and the 2-year tertiary completion rate (TCR), which is calculated as the percentage of young people aged 25-29 who have completed at least two years of tertiary education.

2.4. Measuring Inequalities in Tertiary Access and Attainment

As with access, there are also various ways to calculate inequalities in tertiary education. The choice of indicator can lead to different interpretations about the magnitude of inequalities (d'Hombres, 2010). Measurements of inequality between participation and persistence may vary. In some countries, students may enroll in and attend tertiary education, but not complete the year or graduate. This is common in countries where secondary graduates are guaranteed enrolment in higher education, but end-of-year exams ensure that smaller proportions of students pass. In these cases, inequalities in enrolment may seem low, but inequalities in completion might be much larger. In other contexts, enrolment in tertiary education may be delayed due to late secondary graduation, military service or other factors, resulting in higher levels of inequalities for the age cohort immediately after secondary school than when tertiary completion rates are measured on an older age cohort.

One of the most pressing challenges in measuring inequality in higher education is finding an indicator that can be gathered with sufficient precision, while also being comparable across national contexts (Vallet & Montjouridès, n.d.). In the literature, there are various possible indicators used to calculate wealth-based inequalities in tertiary education, and each has widely recognized limitations.

Wealth Parity Index

The Inter-Agency and Expert Group on SDG indicators has proposed the 'parity index' as the global measure of inequality in education. Others scholars have also advocated for the use of the inter-quintile parity index (Salmi & Bassett, 2014). As discussed above, a 'parity index' is a ratio, calculated for a given indicator between any two groups. In this analysis, I calculate a wealth parity index between the most advantaged (i.e., wealthiest) and most disadvantaged (i.e., poorest) groups.

A parity index typically ranges between 0-1, whereby 0 represents extreme inequality at the expense of one group to 1, which represents parity, meaning both groups have an equal educational attainment for that level.[3] For example, if 30 percent of the poorest and 60 percent of the richest have completed tertiary education, then the wealth parity indicator is 0.50. In contrast, if only 10 per cent of the poorest while 60 of the richest completed tertiary education, the wealth parity index would be 0.16 – indicating substantially higher inequality. Meanwhile, if 45 per cent of both groups completed tertiary education, the parity index would be 1, indicating educational parity between both groups, despite their differences in wealth background. Antoninis, Delprato and Benavot (2016) argue that despite numerous limitations, the parity index is suggested for measuring progress towards the SDGs because it is the easiest to communicate to a broad audience. For most figures, I plan use the adjusted wealth parity index between the poorest and richest quintiles, but also examine the parity index between the poorest 40% and the wealthiest 40%.

[3] Parity indices can be above 1.0, when a more disadvantaged group has a higher participation rate than an advantaged group. For example, the gender parity index is always calculated with females as the numerator, and in many countries, the gender parity index for various levels of education is above 1.0. As explained above, in these contexts, I use the adjusted WPI.

However, one of the major disadvantages of using the wealth parity index, is that the WPI is not symmetrical around 1.0 and has no upper limit when a presumed disadvantaged group is actually outperforming the presumed advantaged group. Therefore, since September 2020, UNESCO Institute of Statistics has recommended using an adjusted WPI (UNESCO Institute of Statistics, 2020). An adjusted WPI is a simple transformation on values that exceed 1.0: it inverts the calculation between the two groups, so that the group with the smaller value (in this case, WIQ5) is the numerator, and then subtracts the new ratio from 2.0. This transformation means that the Adjusted WPI is both symmetrical around 1.0 and ranges between 0-2, creating an absolute upper limit. Because the WPI is above 1.0 for many countries, particularly in Europe, I use the Adjusted WPI throughout the paper. That said, the WPI remains sensitive to the level of overall access, and therefore, the WPI should not be compared between countries with very different levels of tertiary enrolments.

Odds Ratios

In the sociology of higher education, scholars tend to prefer the odds ratio to a parity index because it takes into account two pieces of information: likelihood of participation and likelihood of exclusion. One way to understand the difference between a wealth parity index and an odds ratio is that while the wealth parity index simply takes into account the likelihood that disadvantaged groups participate in higher education relative to wealthier groups, the odds ratio also takes into account the likelihood that both groups participate at all. The odds ratio is a measurement of the odds that an individual will attend or graduate from tertiary education relative to the odds of another group. A key advantage to the odds ratio is that it is 'margin insensitive,' which means the extent of wealth-based inequality does not vary depending on a country's overall entry rate. This makes the odds ratio a preferred measure for those comparing the same country at different points in time, or comparing countries with very different levels of overall enrolment.

The Concentration Index

A major limitation of all inter-quintile indicators discussed above is that all three only capture changes among two discrete groups. Typically, this is operationalized as the most and least advantaged, namely the wealthiest 20% and the poorest 20%. While a wealth parity index and the odds ratio are able to quantify the extent of inequality the middle classes, as compared to the poorest or richest families, in practice, this is rarely done. More fundamentally, by only comparing two groups, neither index provides a measure of overall inequality across the wealth spectrum. The Concentration Index (CI) is an indicator that attempts to provide a more comprehensive measure of inequality, by calculating how "concentrated" outcomes (such as education or wealth) are among a certain proportion of the population (Wagstaff et al., 2007). The CI is defined as "the difference between the cumulative distribution of a criterion variable – for instance, social class – and the cumulative distribution of an outcome in the corresponding groups – for instance, access to higher education" (Vallet & Montjouridès, n.d.).

The CI ranges between -1.0 and 1.0, and a value of 0 indicates equal distribution of opportunities across groups. Larger absolute values indicate greater concentration, with positive values indicating that outcomes (i.e. participation in tertiary education) are concentrated among the wealthiest group. Particularly when it comes to tertiary education, where changes in wealth-based inequalities may stem from changes in the middle classes, the CI can be a useful indicator. However, as with the wealth parity index, the CI is margin-sensitive, meaning that its calculation of inequality is sensitive to the level of overall access, and therefore, the CI should not be used to compare countries with very different levels of tertiary enrolments.

The Entry Rate Gap

While the WPI, OR and CI are all useful indicators for calculating inequalities in educational attainment, they all face a major limitation when applied to higher levels of education, namely, that they cannot account for disparities that are actually caused by unequal outcomes at lower levels of schooling. Because attending in most countries depends on graduating secondary school or its equivalent, many of the disparities in tertiary education may be the result of inequalities in secondary completion. In fact, there are large wealth-based disparities in secondary completion rates, which determine eligibility for tertiary education in most countries. Indeed, in this analysis, disparities in tertiary entry rates may be particularly important, as various studies have suggested that a tuition-dependent private sector may be primarily serving those who have completed secondary school but are unable to access publicly subsidized tertiary education (Buckner, 2013).

To account for unequal secondary completion rates, we can decompose the overall disparity in tertiary attendance into two components: a gap accounted for by differential secondary completion rates (SCRs), and a gap accounted for by differential entry rates (ER) into tertiary education among those who have completed secondary school. This approach follows a Oaxaca-type decomposition (Blinder, 1973; Oaxaca, 1973), a method that is often used in economics to understand wage differentials. The Oaxaca decomposition decomposes an overall gap, such as a wage gap or a tertiary attendance gap, into two components: an observed component and an unexplained or residual component. Although the technique is most often used in economics, scholars have argued that it can be used to study group differences in any continuous and unbounded outcome variable, (Jann, 2008) while modifications can be made to account for the fact that attendance and completion rates in education are bounded. In their most recent report on higher education in Latin America, the World Bank uses it to determine the share of the gap that can be explained by differences in SCRs and the share that can be explained by differences in entry rates (ERs) (Ferreyra et al., 2017, p. 105).

2.5.Selected Indicators

The table below provides an overview of various indicators of inequality in access to higher education, including simplified definitions and basic calculations. Because tertiary attendance and completion rates among the most disadvantage are very low in many countries, I group together the bottom two wealth quintiles, indicated in the calculations as WIQ1&2. Grouping together these two quintiles allows the indicators to be more consistent and robust, particularly in countries where participation rates are very low.

Table 1: Inequality Indicators, Definitions and Calculations

Indicator	Simplified Definition	Calculation
Inter-quintile range	The absolute difference in participation rates between the wealthiest and the poorest students	$TCR_{WIQ5} - TCR_{WIQ1\&2}$
Inter-quintile parity index	The participation rates of the poorest students relative to those of the wealthiest students	$TCR_{WIQ1\&2}/TCR_{WIQ5}$
Adjusted inter-quintile parity index	A recommended transformation for cases when the participation rates of the poorest students exceed those of the wealthiest students to create a value that is capped at 2.0.	2.0 - $(TCR_{WIQ5}/TCR_{WIQ1\&2})$
Inter-quintile odds ratio	The relative difference between the odds that the wealthiest participate compared to the odds that the poorest participate	$\frac{TCR_{WIQ5}/(1-TCR_{WIQ5})}{TCR_{WIQ1}/(1-TCR_{WIQ1})}$
Concentration index	The proportion of higher educational opportunities that are disproportionally held by wealthier groups, calculated as the differences between the cumulative distribution in wealth income quintiles and the cumulative distribution in access to higher education	$(0.2 * TCR_{WIQ2} - 0.2 * TCR_{WIQ1}) + (0.2 * TCR_{WIQ3} - 0.2 * TCR_{WIQ2}) + (0.2 * TCR_{WIQ4} - 0.2 * TCR_{WIQ3}) + (0.2 * TCR_{WIQ5} - 0.2 * TCR_{WIQ4})$
Entry Rate Gap	The absolute difference in the transition rate to tertiary education among those who complete secondary school, calculated in this report as the gap between the wealthiest quintile (WIQ5) compared to all other quintiles	$GAP\,(A–B) = (\mathrm{SCR}_A - \mathrm{SCR}_B)\,\overline{ER} + (\mathrm{ER}_A - \mathrm{ER}_B)\,\overline{SCR}$ $= \overline{SCR\ effect} + \overline{ER\ effect}$

2.6. Operationalizing Wealth-Based Inequalities

A major finding from decades of research on social stratification is that inequalities in educational attainment both reflect and reproduce broader inequalities in society (Hout & DiPrete, 2006). In this study, I focus specifically on measuring wealth-based inequalities in tertiary educational attendance and completion. The definition of family wealth is fundamental to the research, as family wealth is being used to categorize individuals into different groups. However, in the literature on inequality, there are various ways to conceptualize family wealth, and the way we operationalize and measure wealth may affect the findings, namely wealth and income (Morris et al., 2000).

There are two major types of wealth, namely illiquid assets (i.e., land and household items) and liquid assets, which are a type of wealth that can be converted to cash quickly (i.e., cash, stocks, etc.). Families may have differing amounts of each type of wealth, meaning that categorizations may not always align. For example, some families may own land or a house, without necessarily being able to convert these possessions into liquid assets. Liquid assets are typically needed to support education. Particularly when examining access and to private higher education, where most private sector institutions are tuition-dependent, families' liquid assets are likely to be more important than their illiquid assets.

However, for many reasons, many household surveys tend to collect data on household assets, rather than income or consumption, and use these assets to calculate a wealth index. There are important debates over the validity and reliability of using household assets as proxies for wealth, and these debates are particularly important when measures of income may seem be more pertinent to inequality processes. However, particularly in low-income countries, researchers argue that many families may not be able to accurately estimate a total annual income and may not be willing to reveal this information (Deaton, 1997; Morris et al., 2000). In contrast, they are more likely to be able to report on a discrete list of household items. Moreover, numerous studies, many drawing on the DHS and other household surveys included in WIDE, find that wealth indices derived from household assets can be used to reliably proxy expenditures (Filmer & Pritchett, 2001; McKenzie, 2005; Montgomery et al., 2000; Morris et al., 2000). These studies have found that household assets do provide reasonable estimates of inequalities in living standards and map onto differences in educational attainments within the same country.

In this study, I use the wealth income quintile data as reported by WIDE, which uses household assets to classify young people into five groups, known as a wealth income quintiles (WIQ), which group young people into groups of approximately 20% of the population, where WIQ5 means the most economically advantaged (top 20%) and WIQ1 means the least economically advantaged.

3. Data Sources

The primary source of data for my analysis is the WIDE dataset, publicly downloaded from the WIDE website, and dated as the January 23, 2019 release. Although a more recent release of WIDE is now available, this analysis was conducted prior to the new release. There are some data quality issues with the WIDE dataset. Because higher education attendance and completion rates are very low in some countries, some household surveys record very few individuals attending or completion tertiary education in some surveys, making estimates unstable. In addition, for some surveys, the national average and participation and completion rates for all income quintiles are recorded as zero. A national tertiary attendance and completion rate of zero is inconsistent with other data sources; therefore, I remove all country-surveys where the national average and the attendance or completion rates are zero across all wealth quintiles.[4]

Additionally, data for the WIDE dataset come from different household surveys, including (DHS and MICS). In some cases, we have two different surveys from the same country only one year apart, which allows us to compare values from two surveys around the same time as a validation measure. Unfortunately, differences in surveys do not

[4] Surveys removed from attendance rate calculations are: Afghanistan MICS 2011; C. A. R. MICS 2010; Kazakhstan MICS 2010; Kenya DHS 2009; Lao PDR MICS 2006; Philippines DHS 2008; Philippines DHS 2013; Viet Nam MICS 2006; Viet Nam MICS 2010. Surveys removed from the two-year completion rate calculations are: Afghanistan DHS 2015; Bhutan MICS 2010; Nepal DHS 2011; South Sudan MICS 2010; Sudan MICS 2010; Viet Nam MICS 2006; Viet Nam MICS 2010

always align (see Data Notes). In these cases, I have deleted household surveys from the overall dataset that have implausible values. The Data Notes section explains in detail why particular surveys were excluded from the analysis.

After cleaning, the dataset includes 329 surveys from 122 countries for the 2-year completion data, and 324 surveys from 122 countries for the attendance data. While the dataset is one of the largest and most comprehensive available on wealth-based inequalities available cross-nationally, some parts of the world are better represented in the data than others. As Table 2 shows, almost 70% of the observations come from either Europe (40%) or from Sub-Saharan Africa (30%). Given the small number of surveys available from Central and Southern Asia (21), Eastern and South-eastern Asia (18), and Northern Africa and Western Asia (21), it is difficult to disaggregate findings across geographic regions. Moreover, this table includes all surveys available; many surveys conducted in these regions are older; for example, 22 of the surveys of the 65 available in these three world regions were conducted before 2006, and 36 were conducted in or after 2010.

Additionally, there are a number of countries that are notably missing from the WIDE database. In particular, East Asia is not well represented: China, South Korea and Japan are noticeably absent. These countries are not represented in WIDE simply because they do not participate in any of the surveys captured by WIDE, including DHS, MICS or EU-SILC, and a national equivalent is not made available for cross-national comparison. These three countries are large, and have large private sectors that have played an important role in expanding overall access, as well as growing concerns over inequalities in access (Chae & Hong, 2009; Li et al., 2008). Despite these limitations, WIDE is the most comprehensive and up-to-date publicly available data on access and inequalities in tertiary education, making it ideal for this analysis.

Table 2: Total Number of Surveys Included (2-Year TCR), by World Region

	Surveys (N)	% Total	Countries (N)	% Total Countries
World Region				
Central and Southern Asia	21	6.38	10	8.20
Eastern and South-eastern Asia	18	5.47	7	5.74
Europe	132	40.12	37	30.33
Latin America and the Caribbean	36	10.94	18	14.75
Northern Africa and Western Asia	21	6.38	12	9.84
Sub-Saharan Africa	101	30.70	38	31.15
TOTAL	**329**		**122**	

Table 3: Total Number of Surveys Included, by Income Group

Income Group	Surveys (N)	% Total	Countries (N)	% Total Countries
High Income	117	35.56	33	27.05
Upper Middle Income	75	22.8	31	25.41
Lower Middle Income	79	24.01	32	26.23
Low Income	58	17.63	26	21.31
TOTAL	**329**		**122**	

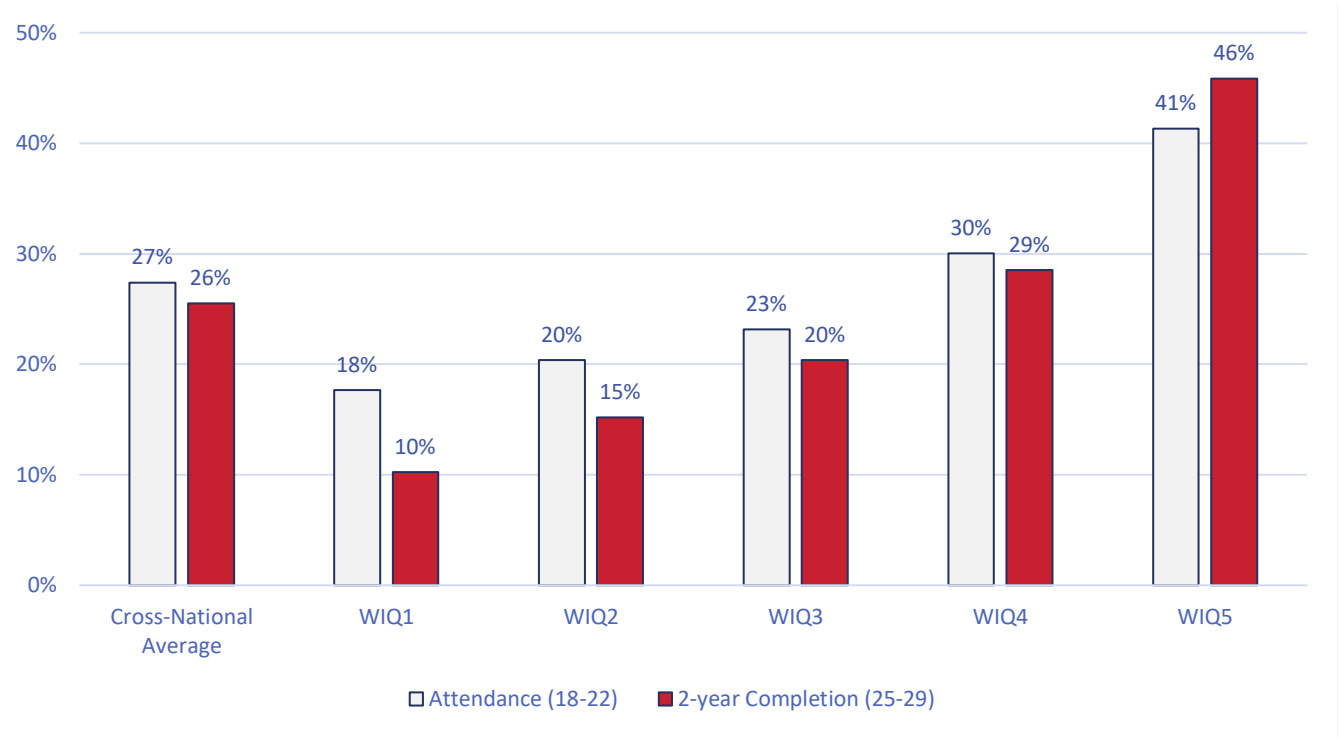
4.Inequalities in Attendance and Completion

4.1.How large are disparities in tertiary attendance and completion?

One way to examine inequalities in tertiary education is to examine how tertiary attendance and completion rates vary across different groups of students. In this section, I compare the percent of the relevant age cohort that attended tertiary education and completed at least two years of higher education for each country-year survey, disaggregated by wealth income quintiles. This descriptive analysis allows us to examine how participation and completion rates vary across all five wealth income quintiles. Higher participation and completion rates are important overall, as higher education is linked to the sustainable development goals, and greater access overall often helps to reduce wealth-based inequalities. Appendices A and B provides a summary of all data available in WIDE regarding the national tertiary attendance rate, two-year and four-year completion rates, disaggregated by wealth income quintiles.

The following figures visualize the extent of inequality in 2-year completion rates cross-nationally. Because higher education access and enrolments have been growing rapidly around the world over the past decade, including surveys that are over a decade old would likely underestimate current participation and completion rates. Therefore, to ensure the data is up-to-date and ensure cross-national comparability, I include only the most recent data for each country, and limit the sample to surveys conducted between 2010-2016.

Figure 1: Attendance (18-22) and Two-Year Completion Rate (25-29), by WIQ (Most Recent Survey, 2010-2016, 108 countries)



To examine how access rates and disparities have changed over time, I also examine two-year completion rates over two time periods. Figure 2: Average National Tertiary Attendance Rates 2002-2009 and 2010-2016, by Wealth Income Quintiles

(Cross-National Average; 122 surveys in 2002-2009 and 202 in 2010-2016)

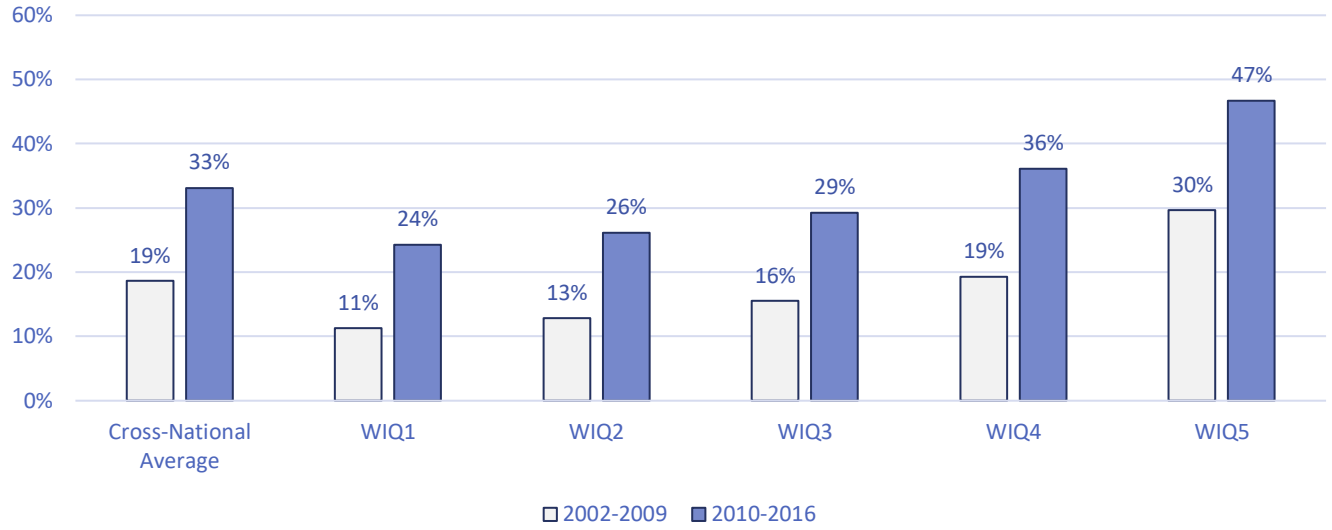


Figure 3 shows the cross-national average of the 2-year tertiary completion rate for all available surveys in WIDE conducted before 2010, and those conducted in and after 2010. The figure demonstrates two important findings. First, as is clear from the change – tertiary completion rates are increasing and this is true across all income quintiles. Cross-nationally, the figure shows that tertiary completion rates have increased from 17% in household surveys conducted before 2010 to 29% in those conducted in or after 2010. Moreover, increases are observed in all income groups. Given that young people in the poorest income quintiles started at such low rates, they have experienced the largest relative growth. For example, TCRs increased from 6% to 14% among the poorest wealth quintile, which represents a 133% increase over the two time periods. Yet, in absolute terms, tertiary completion rates are actually growing fastest among the wealthiest. For example, tertiary completion rates increased among the most advantaged from 32% to 49%, an absolute increase of 17% percentage points. Regardless, a clear finding from the WIDE data is that TCR has increased over the past 15 years.

Secondly, despite the positive indication that tertiary participation rates are increasing, the figure also shows substantial wealth-based disparities. Cross-nationally, among all countries in the dataset, even in the most recent period, only 14% of those aged 25-29 from the poorest wealth quintile have completed two years of tertiary completion while 48% of the wealthiest quintile have. In other words, young people from the wealthiest quintile are 3.5 times more likely to complete two years of tertiary education than those from the poorest quintile, and almost twice as likely to do so compared to those in the middle wealth quintile (Q3).

Figure 2: Average National Tertiary Attendance Rates 2002-2009 and 2010-2016, by Wealth Income Quintiles

(Cross-National Average; 122 surveys in 2002-2009 and 202 in 2010-2016)

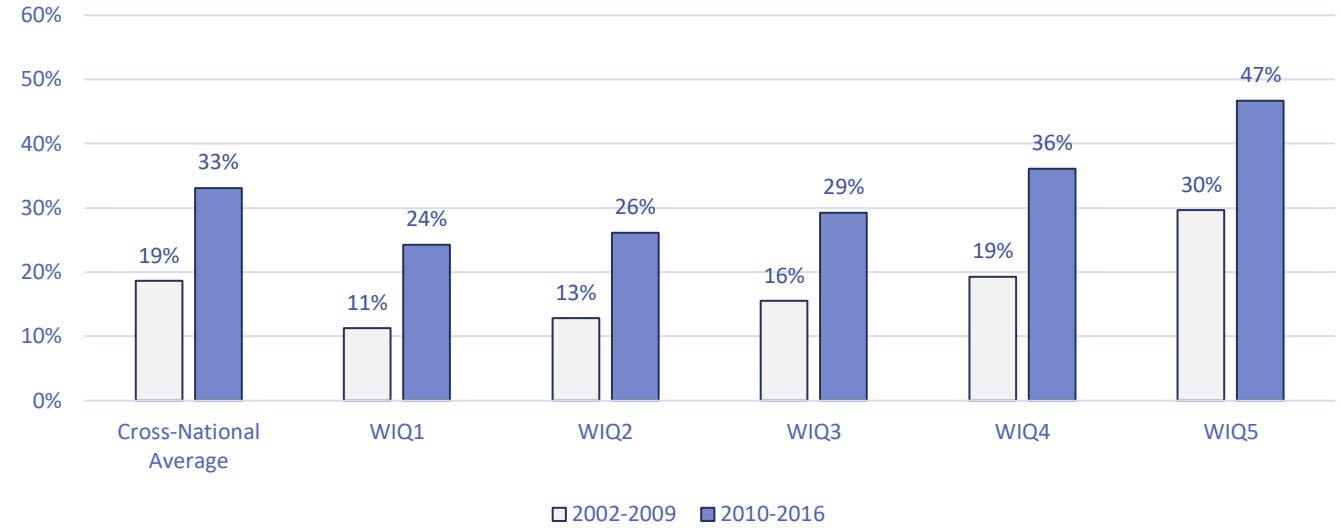
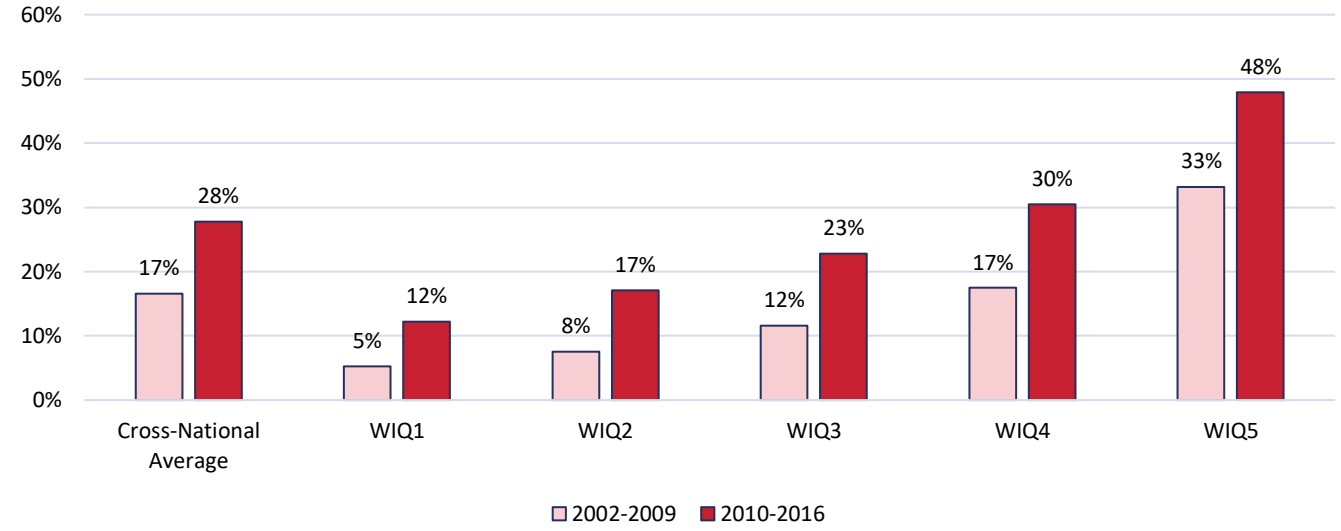


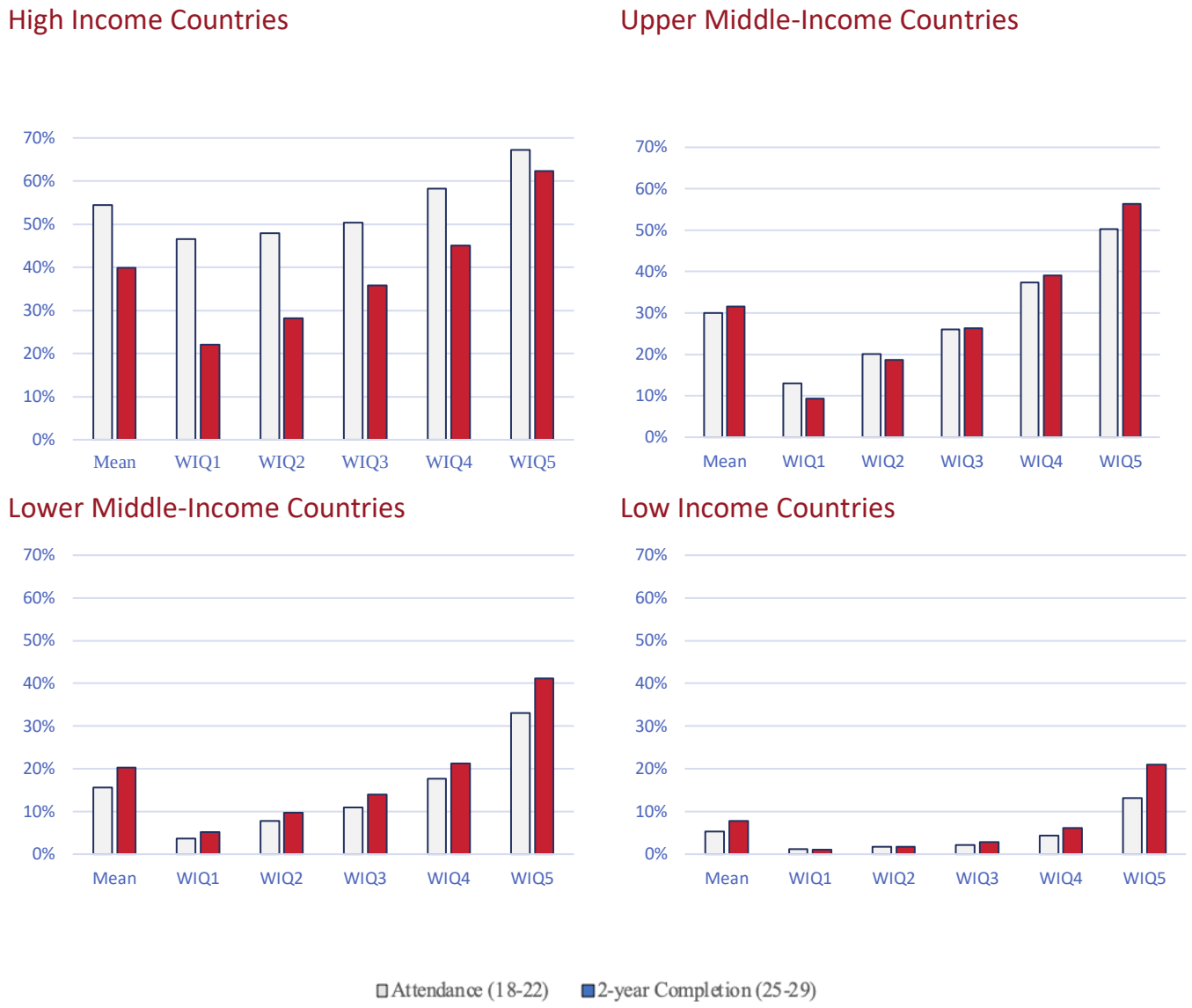
Figure 3: Average National Tertiary Completion Rates before and After 2010, by Wealth Income Quintiles

(Cross-National Average; 126 surveys in 2002-2009 and 203 in 2010-2016



That said, the cross-national averages mask significant cross-national variation in both overall attendance and completion rates and wealth-based disparities. We can also examine how national disparities by examining trends across groups of countries that share common characteristics, such as level of economic development or geography.Figure 4 examines average attendance and completion rates for each wealth income quintile, by national income group. The y-axis is the same for all four plots, in order to facilitate comparison. As the figure shows, attendance and 2-year completion rates are much higher in high-income countries than other countries, and this is particularly true for attendance rates. The figure shows that in low-income countries, only tiny percentages of young people (1-2%) from the poorest 60% of the society ever attend or complete any form of tertiary education. In contrast, the data suggests that in high-income countries, even among the poorest 20% of the population, more than 20% of 25-29-year-olds completed 2-years of tertiary education, and roughly 45% of 18-22-year-olds are enrolled in some form of tertiary education. It is not clear why attendance rates are higher than completion only in high-income countries. It is possible that a higher proportion of young people in middle and lower-income countries enter tertiary education after age 22, and therefore, are not represented in the attendance measures. Alternatively, they may be more likely to be enrolled in shorter programs, whereas in many high-income countries, programs are longer. If this is the case, a higher proportion of the 18-22 age cohort is attending tertiary education in high-income countries.

Figure 4: Tertiary Attendance and Completion Rate, by Country Income Group – Most Recent Year



4.2.How large are inequalities in tertiary attendance and completion?

To measure inequalities in tertiary attendance and completion, in this section, I calculate the Wealth Parity Index, Concentration Index and Odds Ratio for tertiary attendance (18-22-year-old cohort) and two-year completion (25-29-year-old cohort) for each country-survey (See Appendix C). As noted above, when calculating the WPI and OR, WIQ1 and WIQ2 are combined into a single group to constitute the more disadvantaged group, while WIQ5 is used as the advantaged group. In a number of high-income countries and countries in Europe, the WPI is above 1.0, so the adjusted WPI (AWPI) is calculated instead. Table 44 and Table 55 calculate a cross-national average for each of the inequality indicators by country income group (Table 4) and world region (Table 5). While I present all three indicators, for comparison sake, it is worth noting that is particularly difficult to reliably calculate the log odds ratio in Sub-Saharan Africa and low-income countries because there are many countries with 0% of young people from WIQ1 or WIQ2 attending or completing tertiary education, making the denominator zero for part of the calculation. The calculated value of the Odds Ratio is very sensitive to how these zeroes are treated. Therefore, in these tables, I exclude any country where the log odds ratio cannot be calculated due to a zero in the denominator. As result, this table represents a very conservative estimate for inequality in Sub-Saharan Africa and low-income countries. The Odds Ratios would be substantially higher if more fine-grained data permitted excluded countries to be included.

Table 4 shows that the AWPI is lowest, indicating the greatest inequality, in low-income countries, and largest, indicating the most egalitarian, in high income countries. Both the Concentration Index and Log Odds Ratio show similar findings – they are largest in low-income countries, indicating greater inequalities, and lowest in high-income countries.

The table also shows that for all three measures of inequality, attendance rates are more equal than 2-year completion, and this is true across all country income groups. These findings are likely driven by two processes: first, attendance is expanding, and as attendance rates are calculated on a younger age cohort, they may reflect greater inclusion of the 18-22-year-olds, as compared to 25-29-year-olds. At the same time, they may also reflect unequal likelihood of completing 2-years of tertiary education, as we expect wealthier students to have a higher likelihood of completion, while poorer students may attend tertiary program, but not complete, two full years.

Table 5 examines all three indicators of inequality across world regions. The table examining regional groupings shows that the wealth parity index is lowest, and the concentration index and log odds ratio both highest – indicating high inequality – in Sub-Saharan Africa. This is followed by Eastern and South-eastern Asia and Latin American and the Caribbean. These are the world regions where inequalities in tertiary attendance and completion are largest, regardless of the specific indicator we use.

Table 4: Calculation of Inequality Indicators, by Country Income Group (post-2010 only)

	Attendance			**Two-Year Completion**		
	AWPI	CI	Log OR	AWPI	CI	Log OR
High-Income Countries	0.77	0.07	0.92	0.42	0.21	1.75
Upper Middle Countries	0.27	0.33	2.19	0.21	0.38	2.75
Lower Middle Countries	0.13	0.47	2.94	0.12	0.50	3.47
Low Income Countries	0.09	0.59	3.33	0.06	0.61	3.74

Table 5: Calculation of Inequality Indicators, by World Region

	Attendance			**Two-Year Completion**		
	AWPI	CI	Log OR	AWPI	CI	Log OR
Central and Southern Asia	0.21	0.34	2.00	0.23	0.35	2.34
Eastern and South-eastern Asia	0.14	0.44	2.75	0.15	0.45	3.36
Europe	0.75	0.07	0.87	0.41	0.22	1.74
Latin America and the Caribbean	0.12	0.45	3.04	0.13	0.46	3.37
Northern Africa and Western Asia	0.27	0.31	1.90	0.28	0.31	2.14
Sub-Saharan Africa	0.06	0.61	3.59	0.03	0.64	4.07

4.3.How have inequalities changed over time?

To answer the question of whether inequalities are changing over time, I compared the wealth parity index for the 93 countries for which we have at least one survey before 2010 and one after 2010. Table 6 and Table 7 show the three indicators of inequality by country income group for surveys between 2002-2009 as compared to those between 2010-2016 for attendance and TCR, respectively.

Table 6: Calculation of Inequality Indicators in Attendance (18-22), by Country Income Group

	2002-2009			**2010-2016**		
	AWPI	CI	Log OR	AWPI	CI	Log OR
High-Income Countries	0.84	0.02	0.60	0.83	0.03	0.63
Upper Middle Countries	0.22	0.37	2.36	0.24	0.34	2.23
Lower Middle Countries	0.10	0.53	3.19	0.10	0.51	3.09
Low Income Countries	0.02	0.69	4.44	0.02	0.66	3.93

Table 7: Calculation of Inequality Indicators in 2-Year Tertiary Completion Rate, by Country Income Group

	2002-2009			2010-2016		
	AWPI	CI	Log OR	AWPI	CI	Log OR
High-Income Countries	0.37	0.24	1.66	0.45	0.19	1.54
Upper Middle Countries	0.12	0.45	3.07	0.20	0.39	2.77
Lower Middle Countries	0.08	0.53	3.41	0.10	0.52	3.57
Low Income Countries	0.03	0.67	4.35	0.02	0.68	3.96

Table 6 shows that inequalities in tertiary attendance rates, as measured by all three indicators, have changed very little between the two periods, particularly as measured by the AWPI. Changes in Log Odds suggest somewhat larger decreases in inequality in middle-income countries and low-income countries, which suggests possibly slightly more in incorporation of the poorest relative to the wealthiest in these regions.

In contrast, Table 7 shows that inequalities in tertiary completion rates, as measured by all three indicators, seem to be decreasing in most countries over time. For example, the WPI has increased, indicating more equal outcomes, from 0.37 in household surveys conducted in high-income countries before 2010 to 0.45 in surveys conducted in the same countries after 2010. The same is true in upper income countries, where the WPI has increased from 0.12 to 0.20 after 2010. Similarly, measures of the CI and Log Odds Ratio, both decrease in surveys conducted before and after 2010 in high and upper middle-income countries, indicating less inequality. These indicators suggest that regardless of how we measure inequalities in access to higher education, there are positive signs.

However, the indicators of wealth-based inequalities show less improvement in lower middle-income and low-income countries. In lower middle-income countries, the WPI has improved only slightly from 0.08 to 0.10, and the CI has decreased very slightly from 0.53 to 0.52, while the log odds ratio remains identical. While individual countries may be experiencing change, the stability of all three indicators suggests that in general, there has been little change in aggregate wealth-based inequalities over the past 15 years in lower-middle-income countries on average.

Meanwhile, in low-income countries, there inequality indicators point to contrasting interpretations. On one hand, when measuring the log odds ratio, it appears that inequalities are decreasing in low-income countries – the construction of the indicator means that even small increases in participation among the poorest can have a significant impact on the log odds ratio. However, at the same time, there seems to be very little change in the WPI and CI, and in both cases, the indicators point to very small increases in inequality.

Table 8: Calculation of Inequality Indicators (Attendance), by World Region

	2002-2009			2010-2016		
	AWPI	CI	Log Odds	AWPI	CI	Log Odds
Central and Southern Asia	0.13	0.43	2.54	0.17	0.38	2.25
Eastern and South-eastern Asia	0.09	0.50	3.26	0.15	0.43	2.75
Europe and Northern America	0.75	0.07	0.78	0.80	0.05	0.71
Latin America and the Caribbean	0.17	0.46	3.06	0.13	0.43	2.79
Northern Africa and Western Asia	0.24	0.31	2.15	0.34	0.24	1.74
Sub-Saharan Africa	0.05	0.60	3.80	0.04	0.60	3.79

Table 9: Calculation of Inequality Indicators (2-Year TCR), by World Region

	2002-2009			2010-2016		
	AWPI	CI	Log Odds	AWPI	CI	Log Odds
Central and Southern Asia	0.11	0.48	3.07	0.21	0.39	2.79
Eastern and South-eastern Asia	0.07	0.53	3.84	0.17	0.43	3.54
Europe	0.34	0.25	1.72	0.44	0.20	1.56
Latin America and the Caribbean	0.05	0.55	4.00	0.08	0.51	3.40
Northern Africa and Western Asia	0.28	0.29	2.15	0.35	0.23	2.08

Sub-Saharan Africa	0.05	0.60	3.68	0.04	0.60	3.90

These tables show that, as those calculated by income groups, there is reason to believe that inequality is declining in most world regions, regardless of how we measure inequality. Notably, the indicators suggest that wealth parity is increasing substantially in Central and Southern Asia, Eastern and South-eastern Asia, Europe and North America, and Northern Africa and Western Asia, where the WPI has increased by roughly 0.10 over the two time periods. For the WPI to increase this markedly implies that the tertiary completion rate among the poorest quintile is increasing more than that of the wealthiest quintile. Similarly, indicators of wealth concentration and exclusion - the CI and log odds ratio both indicate similar interpretations – tertiary attendance and completion rates are less concentrated among the wealthiest, at the exclusion of the poorest, in the most recent years. The CI has fallen most in Central and Southern Asia, Eastern and South-eastern Asia and Northern Africa and Western Asia, with more modest declines in Europe and Latin America.

In contrast, it is not clear that inequality is improving much in Latin America or sub-Saharan Africa, where changes are both very small and indicators of inequality show contrasting trends. In fact, two-year completion in Africa seems to be worsening according to two of the three indicators. For attendance, the AWPI in Latin America shows worsening inequality, while the other two indicators suggest very small improvements. In Africa, all three indicators of inequality show very small changes in the direction of less inequality. The WPI increased ever so slightly between the two time periods, suggesting greater relative inclusion among the poor. The CI also declined by a small amount, indicating slightly less concentration, for attendance. The log OR also points to very small improvement, which could represent greater relative inclusion among the poorest. However, it is worth noting that in both regions, changes are very small in comparison to other world regions, where there are pretty clear and convincing signs of declining inequality. Meanwhile, indicators of inequality in TCR in Africa seem to have worsened somewhat over the two time periods. The WPI actually declined slightly, the CI did not change, and the log odds ratio actually increased somewhat from 3.68 to 3.90 – indicating worsening inequalities.

To understand these contradictory trends, I examined attendance and two-year completion rates among the surveys from both Latin America and Sub-Saharan Africa, by wealth quintile, as shown in Table 10 and Table 11. Both tables show that the proportion of young people from the top wealth quintile attending and graduating tertiary education increased noticeably between the two periods, while the changes in absolute terms for young people from the bottom two quintiles were very small. In Table 10, because the indicators are calculated from such a low proportion for WIQ1 and WIQ2 in the first period, even small changes between the two time periods can change the calculation of the indicators. For example, the small increase from 0.3% of WIQ2 students attending tertiary to 0.5% in surveys in and after 2010 improves the WPI ever so slightly, despite a more noticeable increase in attendance, from 7.7% to 12.1%, among WIQ5 students. In Table 11, the data from Latin America seems to show that students in WIQ1 are being left behind, in comparison to other wealth quintiles, where attendance rates are increasing more noticeably. In short, Table 8 and Table 9 and the supplementary analysis in Table 10 and Table 11 both suggest that that unlike other world regions, where inequality is improving, there is not as clear evidence for the same in sub-Saharan African countries. While there may be small increases in attendance among the poorest, inequalities in tertiary completion rates may actually be worsening in sub-Saharan Africa and other low-income countries.

Table 10: Tertiary Attendance and TCR Rates in Sub-Saharan Africa, by Decade

Africa	**Attendance (18-22)**						**2-Year Tertiary Completion Rates (24-29)**					
	WIQ1	**WIQ2**	**WIQ3**	**WIQ4**	**WIQ5**	**WPI**	**WIQ1**	**WIQ2**	**WIQ3**	**WIQ4**	**WIQ5**	**WPI**
2002-2009	0.002	0.003	0.007	0.021	0.077	0.024	0.002	0.008	0.014	0.038	0.131	0.030
2010-2016	0.002	0.005	0.013	0.035	0.121	0.027	0.004	0.008	0.022	0.054	0.204	0.023

Table 11: Two-Year Attendance and TCR Rates in Latin American and the Caribbean, by Decade

LAC	Attendance (18-22)						2-Year Tertiary Completion Rates (24-29)					
	WIQ1	WIQ2	WIQ3	WIQ4	WIQ5	WPI	WIQ1	WIQ2	WIQ3	WIQ4	WIQ5	WPI
2002-2009	0.020	0.049	0.086	0.157	0.321	0.149	0.011	0.027	0.076	0.139	0.367	0.045
2010-2016	0.033	0.080	0.138	0.226	0.414	0.120	0.020	0.058	0.111	0.218	0.471	0.075

4.4. Decomposing Sources of Disparities in Tertiary Attendance

The descriptive analyses above indicate large inequalities in higher education attendance and completion. However, none of the inequality indicators calculated above account for the fact that there are large wealth-based disparities in secondary completion rates, which determine eligibility for tertiary education in most countries. Indeed, both the literature on higher education access in sub-Saharan Africa suggests, and subsequent analyses (See: The figures show that the largest gaps are in upper middle-income countries, where both SCRs and ERs are large. In contrast, ERs in low-income countries are quite small, and the regional analysis shows that disparities in sub-Saharan Africa are very small, which is likely related to the low rates of both secondary completion and tertiary attendance. The regional analysis also shows that disparities in ER are largest in Latin America and East Asia. The ER gap is largest in Latin America – Latin America is the only region in the sample where disparities in access to tertiary are larger due to disparities in ER, rather than disparities in SCRs. In contrast, South Asia stands out as a region where gaps in tertiary attendance seem to be driven almost entirely by disparities in SCR. The data suggest that individuals from lower family wealth backgrounds are actually transitioning into tertiary at equal or higher rates than the wealthiest cohort, after accounting for their unequal SCRs. There are various possible explanations for this finding; first, in countries where secondary completion is not universal, students from lower wealth quintiles are likely to be more positively selected into higher levels of schooling than those from wealthier backgrounds. This is because students from wealthy families often have access to additional supports or resources, such as private tutors, that can help them graduate secondary schooling, whereas those from lower wealth backgrounds do not. As a result, secondary completers from low-income backgrounds are often particularly able and motivated to succeed relative to their peers. Among secondary completers, they may actually be more likely to transition to higher education. This would be the case if places in the public sector are reserved for the highest achieving, and as a proportion of all secondary completers, those from lower wealth quintiles are actually over-represented among the highest achieving. Secondly, in a number of countries, public policies play a role, by reserving a particular number of spaces for those from lower wealth backgrounds or other groups who have traditionally been marginalized, such as scheduled castes in India and low-income or non-White populations in Brazil. As a result, students from these backgrounds may actually be more likely to transition to tertiary education, particularly in the public sector where these seats are reserved, than their wealthier peers.

Figure 8: Decomposition Analysis), suggest that much of the gap in tertiary attendance is due to large wealth-based inequalities in secondary completion rates (Ilie & Rose, 2018). Indeed, in this analysis on the role of the private sector, disparities in tertiary entry rates are particularly important, as various studies have suggested that a tuition-dependent private sector may be primarily serving those who have completed secondary school but are unable to access publicly subsidized tertiary education. Therefore, to understand the role that unequal transition rates to tertiary education are driving inequalities, I decompose the overall disparity in tertiary attendance into its two components: a gap accounted for by differential secondary completion rates (SCRs), and a gap accounted for by differential entry rates into tertiary education among those who have completed secondary school, following the method adopted by Ferreya et al. (2017).

To conduct this decomposition, ideally, data should be available on the secondary completion rate and attendance rate of the same sample of young people. This is not possible with existing data that is publicly available in WIDE. However, in my analysis, I am able to closely approximate age cohorts by pairing the data on higher education attendance among 18-22-year-olds with the SCR among young people who are 3-5 years above upper secondary school graduation age. For most countries, this refers to young people aged 21-23 or 22-24, as the modal upper

secondary school graduation age cross-nationally is 18 or 19, with a smaller proportions of countries having upper secondary school age at 17, and a very small number of outliers falling outside this range (UIS, 2020). Using this decomposition method, I calculate the proportion of disparities in tertiary attendance due to differential entry rates cross-nationally and in different countries.

Error! Not a valid bookmark self-reference. shows the results of the decomposition analysis, averaged across all surveys, for each WIQ. The figure shows that the overall size of the disparity between the wealthiest 20% and other WIQs, in percentage points, successively declines. This indicates that tertiary attendance rates between WIQ5 and WIQ4 are much closer than those between WIQ5 and WIQ1, the least advantaged. In addition, the figure shows that the amount of the gap accounted for by differential SCRs also decreases as family wealth increases. Specifically, differences in SCRs account for 70% of the gap in tertiary attendance rates between WIQ1 and WIQ5. In contrast, this is 57% for WIQ2, and roughly 52% for WIQ3 and WIQ4, although the size of the gap is smaller for WIQ4. Overall, across all countries in the dataset, when comparing the wealthiest to all other groups, disparities in SCR account for roughly 59% of the tertiary attendance gap, and differential entry rates into tertiary account for 41% of the gap. It is this disparity in the likelihood to attend tertiary that seems to be most likely affected by the existence and growth of a private tertiary sector. However, it is worth noting that it is necessarily the case that we should expect the tertiary entry gap to be positive; secondary completers from the poorest quintiles likely represent only the strongest students academically. In contrast, families with significant cultural and financial resources can help their children complete secondary school with lower academic aptitude. As a result, it is possible for poorer students to have higher rates of transferring to tertiary education than their wealthier peers. However, overall, this does not appear to be the case. Instead, secondary graduates from poorer backgrounds are less likely to transfer to tertiary, which would be the case if they could not afford to attend tertiary, whether due to direct costs (i.e., tuition), or indirect costs (i.e., lost income).

Figure 6 disaggregates the decomposition analysis by country income group. The figure shows that the largest disparities are in upper middle-income countries, and these disparities are driven by both large disparities in SCRs and large disparities in ERs. Lower middle-income countries follow a similar pattern, with larger disparities in both SCR and ERs than either high income or low-income countries. The smallest disparity due to ER is in low-income countries, which is likely due to low overall attendance rates.

Figure 5: Decomposition Analysis (SCR vs. ER), by WIQ

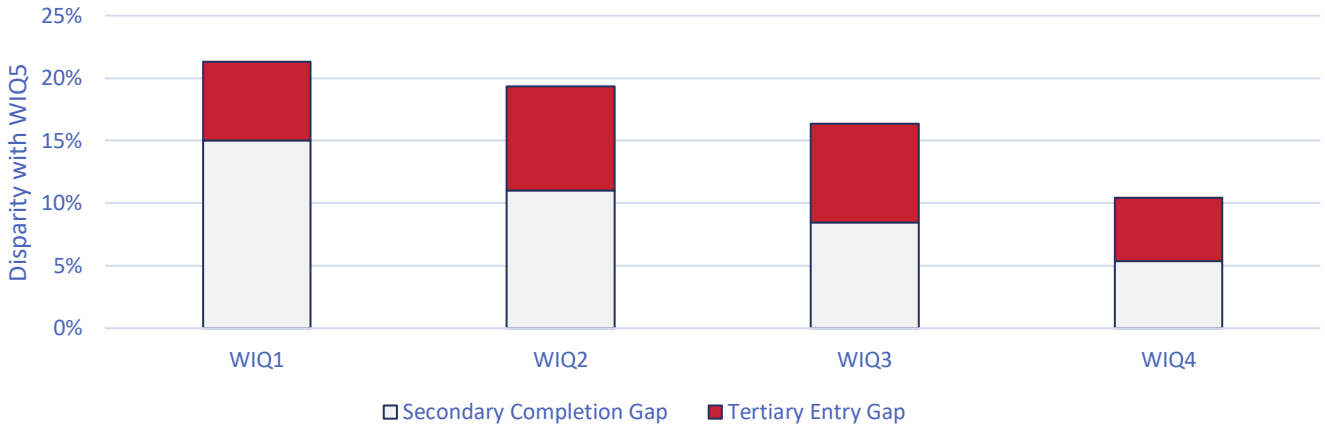


Figure 6: Decomposition Analysis (SCR vs. ER), by Country Income Group

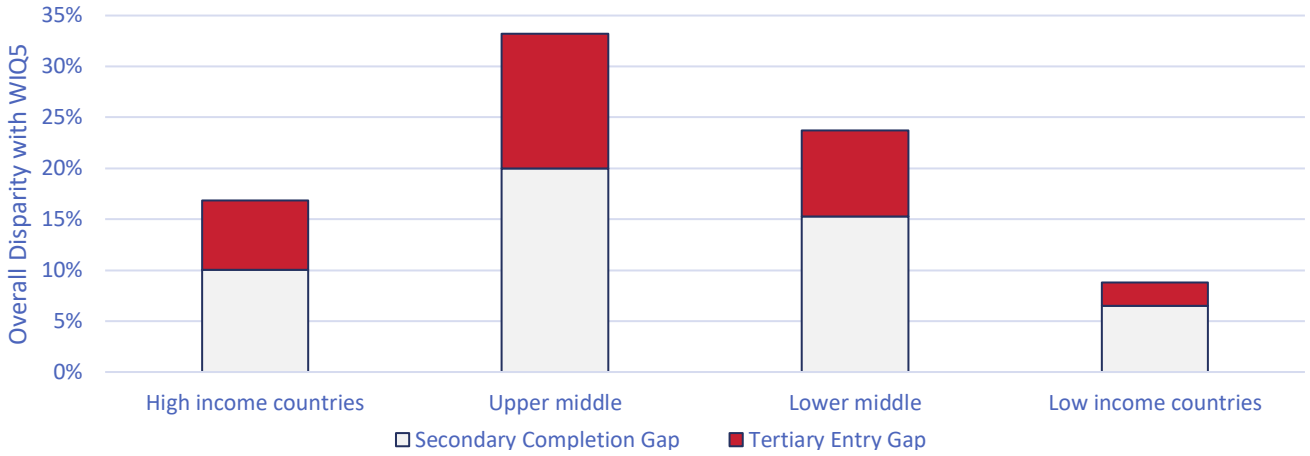


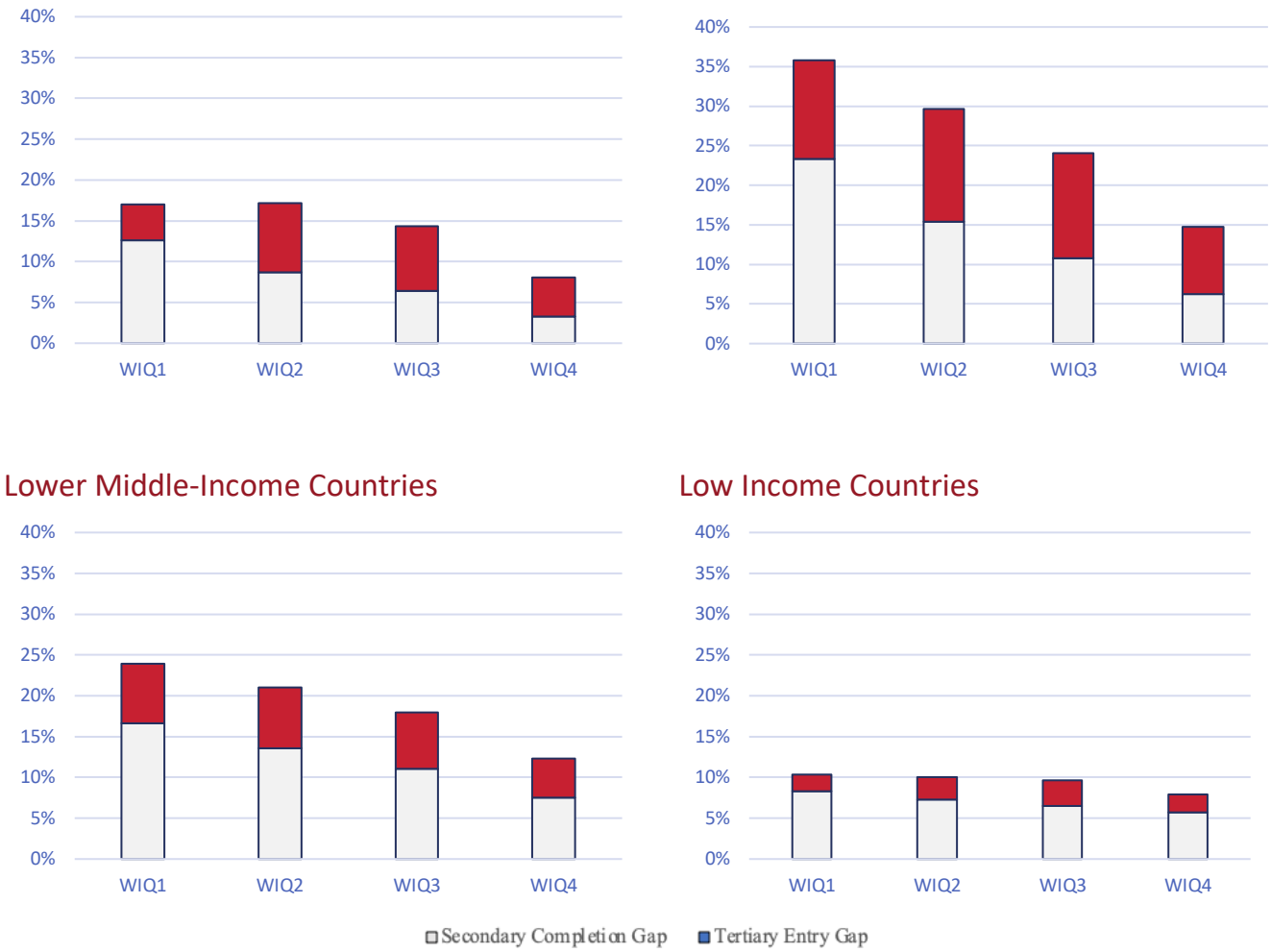
Figure 7 and The figures show that the largest gaps are in upper middle-income countries, where both SCRs and ERs are large. In contrast, ERs in low-income countries are quite small, and the regional analysis shows that disparities in sub-Saharan Africa are very small, which is likely related to the low rates of both secondary completion and tertiary attendance. The regional analysis also shows that disparities in ER are largest in Latin America and East Asia. The ER gap is largest in Latin America – Latin America is the only region in the sample where disparities in access to tertiary are larger due to disparities in ER, rather than disparities in SCRs. In contrast, South Asia stands out as a region where gaps in tertiary attendance seem to be driven almost entirely by disparities in SCR. The data suggest that individuals from lower family wealth backgrounds are actually transitioning into tertiary at equal or higher rates than the wealthiest cohort, after accounting for their unequal SCRs. There are various possible explanations for this finding; first, in countries where secondary completion is not universal, students from lower wealth quintiles are likely to be more positively selected into higher levels of schooling than those from wealthier backgrounds. This is because students from wealthy families often have access to additional supports or resources, such as private tutors, that can help them graduate secondary schooling, whereas those from lower wealth backgrounds do not. As a result, secondary completers from low-income backgrounds are often particularly able and motivated to succeed relative to their peers. Among secondary completers, they may actually be more likely to transition to higher education. This would be the case if places in the public sector are reserved for the highest achieving, and as a proportion of all secondary completers, those from lower wealth quintiles are actually over-represented among the highest achieving. Secondly, in a number of countries, public policies play a role, by reserving a particular number of spaces for those from lower wealth backgrounds or other groups who have traditionally been marginalized, such as scheduled castes in India and low-income or non-White populations in Brazil. As a result, students from these backgrounds may actually be more likely to transition to tertiary education, particularly in the public sector where these seats are reserved, than their wealthier peers.

Figure 8 further disaggregate the decomposition by country income group and world region.

Figure 7: Decomposition Analysis (SCR vs. ER), by WIQ compared to WIQ5, by Country Income Group

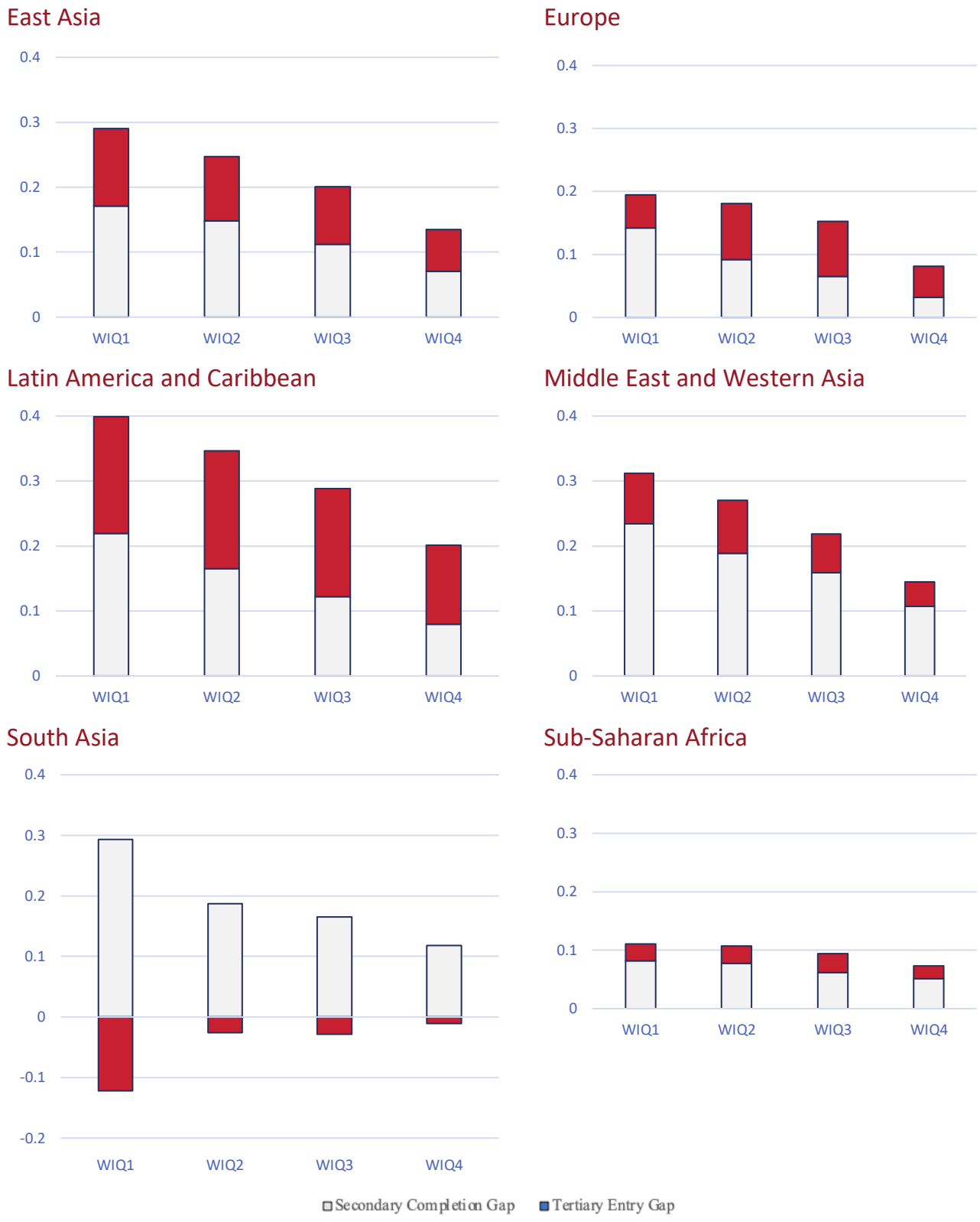
High Income Countries

Upper Middle-Income Countries



The figures show that the largest gaps are in upper middle-income countries, where both SCRs and ERs are large. In contrast, ERs in low-income countries are quite small, and the regional analysis shows that disparities in sub-Saharan Africa are very small, which is likely related to the low rates of both secondary completion and tertiary attendance. The regional analysis also shows that disparities in ER are largest in Latin America and East Asia. The ER gap is largest in Latin America – Latin America is the only region in the sample where disparities in access to tertiary are larger due to disparities in ER, rather than disparities in SCRs. In contrast, South Asia stands out as a region where gaps in tertiary attendance seem to be driven almost entirely by disparities in SCR. The data suggest that individuals from lower family wealth backgrounds are actually transitioning into tertiary at equal or higher rates than the wealthiest cohort, after accounting for their unequal SCRs. There are various possible explanations for this finding; first, in countries where secondary completion is not universal, students from lower wealth quintiles are likely to be more positively selected into higher levels of schooling than those from wealthier backgrounds. This is because students from wealthy families often have access to additional supports or resources, such as private tutors, that can help them graduate secondary schooling, whereas those from lower wealth backgrounds do not. As a result, secondary completers from low-income backgrounds are often particularly able and motivated to succeed relative to their peers. Among secondary completers, they may actually be more likely to transition to higher education. This would be the case if places in the public sector are reserved for the highest achieving, and as a proportion of all secondary completers, those from lower wealth quintiles are actually over-represented among the highest achieving. Secondly, in a number of countries, public policies play a role, by reserving a particular number of spaces for those from lower wealth backgrounds or other groups who have traditionally been marginalized, such as scheduled castes in India and low-income or non-White populations in Brazil. As a result, students from these backgrounds may actually be more likely to transition to tertiary education, particularly in the public sector where these seats are reserved, than their wealthier peers.

Figure 8: Decomposition Analysis (SCR vs. ER), by WIQ, compared to WIQ5, by Region



5.The Growth of Private Tertiary Education

Over the past three decades, there has been a significant growth in the number of private higher education institutions (HEI) worldwide (Buckner, 2017b; Levy, 2006). Today, roughly one-third of all students are enrolled in private higher education (Levy, 2018). In this analysis, I explore how enrolments in private tertiary education are associated with wealth-based inequalities in tertiary education. The primary indicator of private enrolment is the percentage of tertiary students enrolled in the private tertiary sector in the country-year in which the household survey was taken. Typically, private enrolment means the percentage of students enrolled in private degree-granting institutions, including both two and four-year degrees but excluding post-secondary certificates, career colleges, and equivalents.

Data for the private percentage of tertiary enrolments comes from UIS and the Program for Research on Private Higher Education (PROPHE). UIS's definition of a private tertiary institution is defined by institutional control. Private institutions are defined as "those controlled and managed by a non-governmental organisation or whose governing board consists most of members not selected by a public agency" (UIS 2020). Among those categorized as private, there are two categories: "government-dependent private institutions," which receive at least 50% of their core funding from government agencies or whose teaching personnel are paid by a government agency, and "independent private institutions," which includes both independent and government dependent private institutions.[5] This definition classifies a number of universities that were founded by acts of legislature and therefore independent of government, as private. For example, the United Kingdom, the Netherlands, and Namibia are all listed as having 100 percent of its tertiary students enrolled in the private sector by UIS. However, this definition conflicts with the widely shared understandings of these universities as public within those countries, in that they are viewed as public-serving and typically receive public funding. In contrast to UIS, PROPHE defines private institutions as: "whatever is legally treated as private within a given country" (PROPHE 2020). For example, PROPHE notes that according to its definition, private providers were only allowed to open in the UK in 2011, even while UIS notes that the UK has 100% of enrolments in the private sector since it began collecting data in 1998. [6] In this report, I draw on both sources of data, but find PROPHE's definition more convincing and more accurate for cases, such as the UK, and so use PROPHE to make specific data substitutions, detailed in the Technical Appendix.

Data is available in UIS from 1998 to 2016 with considerable missing observations, particularly before 2005. PROPHE has published cross-national data on the private share of enrolments in 2010 for over 200 countries, which draws on UIS data when available but also supplements it with data from national sources and modifies UIS data in certain national contexts where their definition of the private sector differs from that of UIS. PROPHE details the adjustments they made to their 2010 data that account for the national contexts. In this report, I draw on UIS data when available, and merge in PROPHE data for the year 2010 if it is available and UIS data is missing. In instances where definitions of private vary substantially, I rely on PROPHE definitions and replaced these observations with data from the Program on Private Higher Education (PROPHE), or recode observations as missing when the definitional conflict remains unresolved (i.e., Netherlands and Namibia). To fill in missing data, I use linear interpolation within country and extrapolate when necessary, bounding extrapolation between 0-100.

In the figures below, I graph the percentage of all enrolments in the private sector, between 2000-2016, disaggregated by country income group and world region. In both figures, I weight each observation by the total enrolment in tertiary, to account for vast differences in national populations. As both Figure 9 and

Figure 10 show, rates of private tertiary enrolments have remained relatively steady in many countries over the past two decades, particularly in high income and upper middle-income countries. The regional analysis shows that the largest growth in private share has occurred in Sub-Saharan Africa and South Asia. The short time frame for which data is available likely makes the time trend look more stable than it would if data were available for a longer time frame, including prior to 1990, when private higher education began to grow rapidly globally.

[5] UIS categorizes public and private based on overall control of the institution: private institutions are those controlled and managed by a non-governmental organisation or whose governing board consists most of members not selected by a public agency. Then, among those categorized as private in terms of overall control, there are two categories: "government-dependent private institutions," which receive at least 50% of its core funding from government agencies or whose teaching personnel are paid by a government agency, and "independent private institutions." Source: http://uis.unesco.org/en/document/uoe-data-collection-manual-2020

[6] For details on the national considerations in compiling the dataset refer to PROPHE (2020).

Figure 9: Private Share of Tertiary Enrolments, by Country Income Group (2002-2017) (Weighted by Total Enrolment)

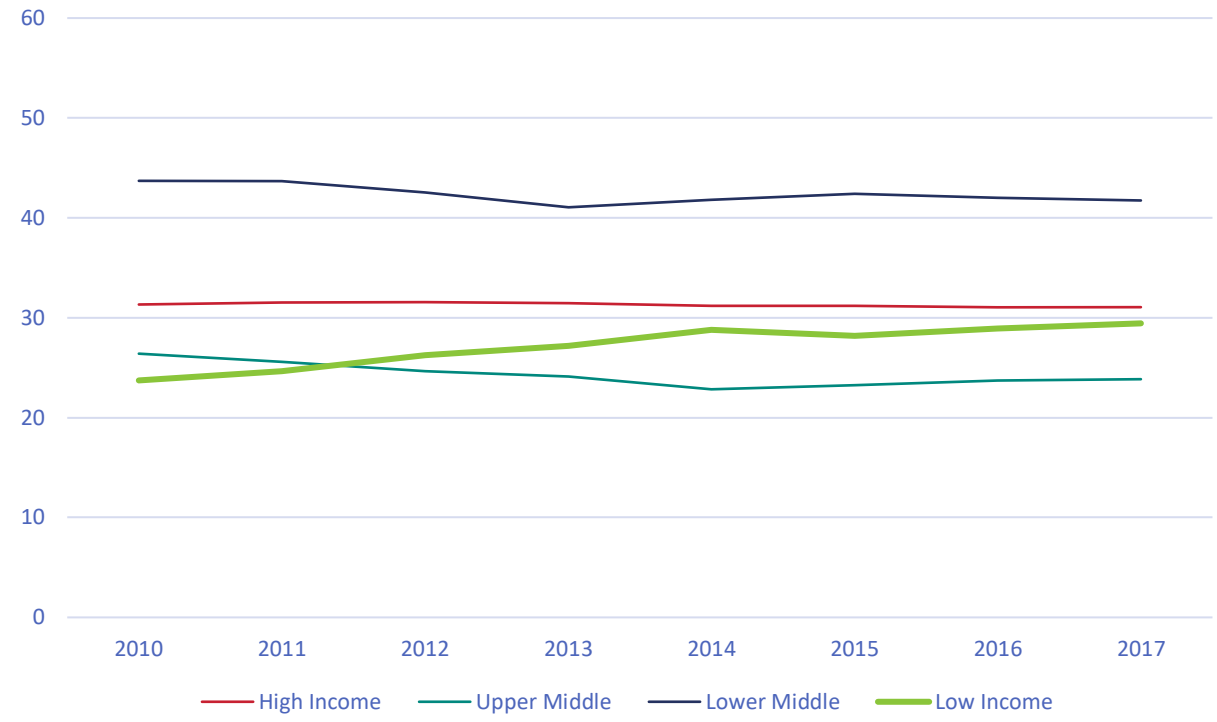
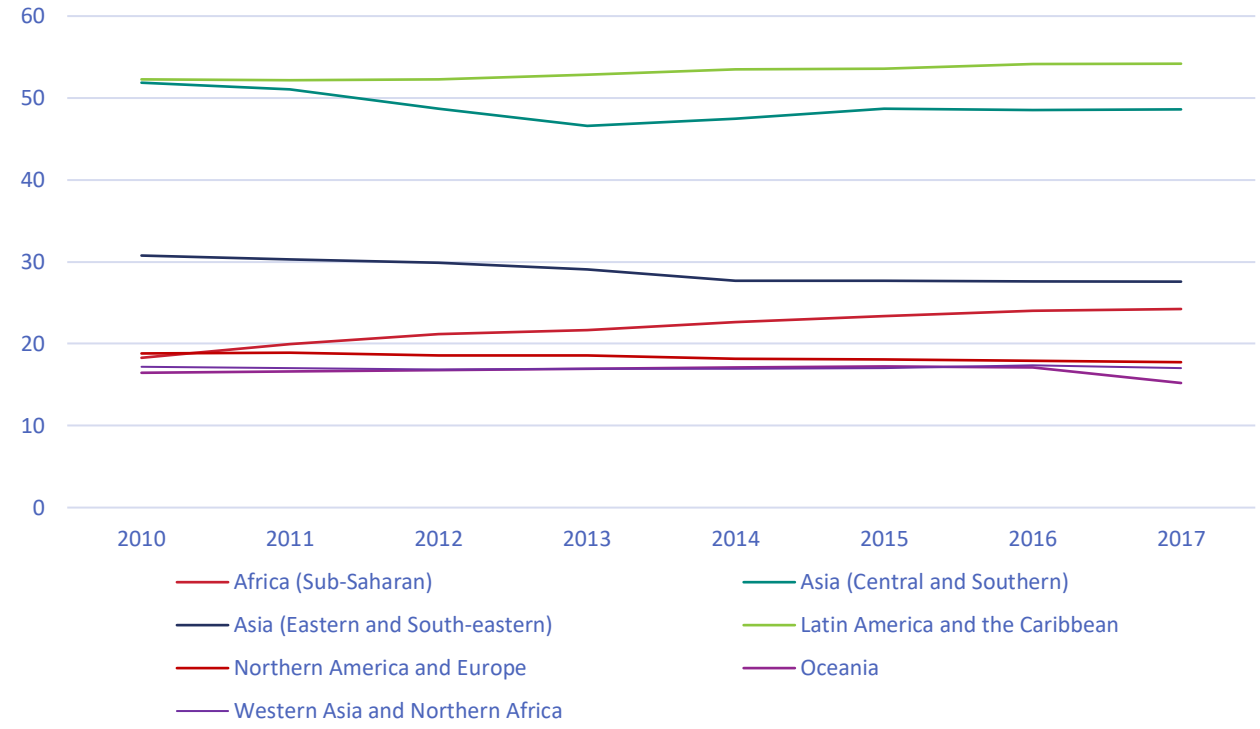


Figure 10: Private Share of Tertiary Enrolment, by World Region (2002-2017) (Weighted by Total Enrolment)



Data Sources: UIS and PROPHE

6.Private Sector Composition Analysis

The question of whether the private sector improves or exacerbates inequalities depends on *who is attends the private sector*. In general, we assume that when it is primarily the wealthy (WIQ5) who are attending the private sector, then inequalities in access will increase. In contrast, if those from wealthy backgrounds capture most of the subsidized seats in the public sector, and the private sector expands to serve primarily those from poorer backgrounds, it may actually play a role in reducing inequalities in higher education attendance.

To better understand how students from different wealth backgrounds are distributed between the public and private sector, we need more fine-grained data than is available in WIDE. Luckily, cross-national and longitudinal data exists for Latin American countries, and is made available by The Center of Distributive, Labor and Social Studies (CEDLAS) at the University Nacional de la Plata – Argentina (CEDLAS and The World Bank, 2020). The data is extracted from nationally representative surveys and includes the net tertiary entry rate and the percentage of students enrolled in the public sector, disaggregated by wealth income quintile, over time. Using this data, I am able to examine who attends the private sector, if wealth-based inequalities vary by sector, and how these change over time.

I first examine if the wealthy (WIQ5) are over represented in the public or private sector, and how this varies by country. In Figure 11, I graph the average proportion of all enrolments in each sector accounted for by quintile, and in Figure 12 I calculate a sector-specific Wealth Parity Index. If students from each quintile were represented proportionate to their representation in the population, then they would account for 20% of all enrolments in each sector. However, as the figure shows, higher education systems in Latin America are highly unequal. In every single Latin American country for which we have data, students from the wealthiest quintile are overrepresented in both public and private sector tertiary institutions. Meanwhile, those from the poorest quintile are under-represented. Moreover, Figure 11 also shows that in every country, this disproportionate representation is larger in the private sector than the public sector. The wealthiest quintile account for an even greater proportion of seats in the private sector than in the public sector – and this holds true for every country examined. For example, the Figure shows that in Argentina, the wealthiest quintile of students accounts for 30% of seats in the public sector, but 45% in the private sector. Meanwhile, students from the poorest quintile account for 10% of those in the public sector compared to only 6% of enrolments in the private sector. In Guatemala, the wealthiest account for 70% of all seats in the public sector and 80% in the private sector.

The private sector differentially benefits the wealthiest quintile most in Peru, Bolivia, Uruguay, and Ecuador. For example, in Peru the wealthiest quintile accounts for a full half (50%) of all seats in private universities, compared to only 24% in the public sector. Meanwhile, the poorest quintile account for 11% of seats in public universities, compared to less than 3% in private universities. Indeed, Peru has the most equal access to the public sector of all countries in the dataset; yet, its overall parity index is lower than other countries as a result of highly unequal access in the private sector. Chile stands out within the region in that it's public and private sectors have very similar levels of inequality and the level of representation among students from WIQ1 and WIQ5 are similar in both sectors. While it's parity index in the public sector is relatively high, but in line with other nations in the region (e.g., Argentina and Ecuador), wealth parity in its private sector is the highest in the region by far. Wealth parity in the private sector in Chile is 0.33; the next closest private sector WPI is in Argentina, which is only 0.14.

Figure 11: Share of Enrolments, by WIQ (Most Recent Year)

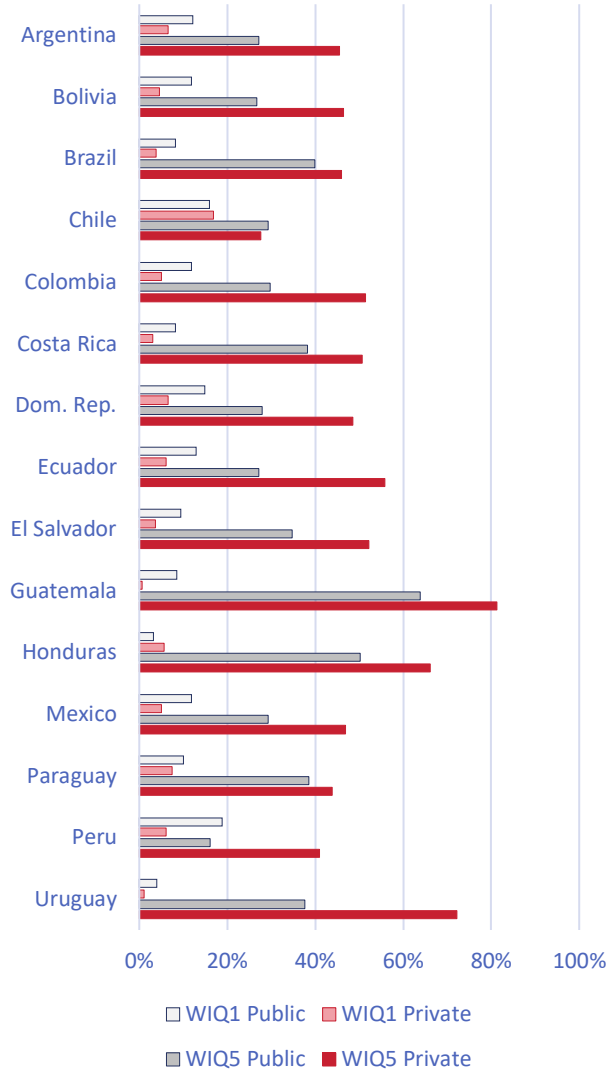
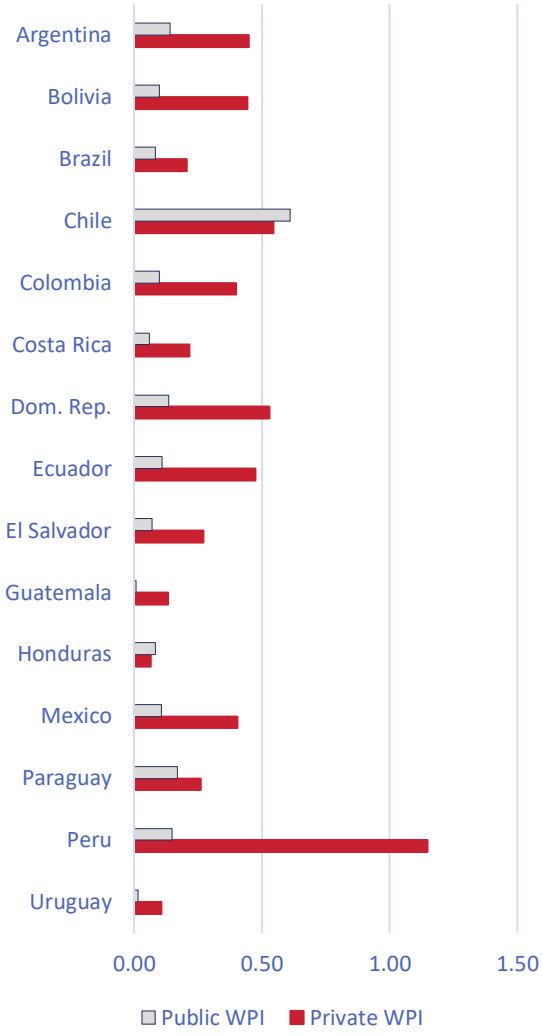


Figure 12: WPI, by Sector (Most Recent Year)



The SEDLAS data also allows us to examine how the wealth distribution of enrolments changes over time, which is useful to understand how the distribution of enrolments is changing over time, and relatedly, how each sector may be contributing to the overall inequality dynamics in the country. To examine how the distribution of enrolments in each sector has changed over time, I calculated the share of each sector's enrolments filled by students from the top and bottom quintiles, over time. In Figure 13, I plot these distributions for selected countries that represent different patterns. Argentina represents a common pattern throughout the region – students from the wealthiest quintile (WIQ5) make up roughly half of all enrolments in the private sector, and somewhat less, but still the plurality, in the public sector. Moreover, over the past 15 years, there have been only slight declines in the concentration of the wealthy, and increasing incorporation of the poorest into both sectors.

The relatively stability of Argentina is highlighted when comparing it to the case of Chile, which has clearly experienced greater equality of representation in both sectors. This is observed by the decrease in the proportion of seats occupied by the wealthiest quintile (i.e., the blue lines) and a noticeable increase in the proportion of seats occupied by the poorest quintile (i.e., the grey lines). For example, in 2000, the first year of data, students from WIQ5 occupied 40% of seats in the public sector and 50% in the private sector; by 2016, this had fallen to roughly 30% in each sector, suggesting an even starker decline in the private sector than the public sector. In fact, in the most recent years, there has been an interesting shift, whereby the wealthiest quintile is slightly more overrepresented in the public sector than the private sector. As discussed in reference to Figure 12 Chile is an also interesting outlier in the region, as there is very little difference between the two sectors. In Figure 13 this is

observable by the lack of a gap between either of the two blue lines (WIQ 5) or grey lines (WIQ1), suggesting that within the same quintile, roughly the same proportion of students are found in the public sector and the private sector. This has been discussed in the literature, and is the result of Chilean higher education policies, which provide public funding for students in both sectors (Bernasconi, 2004; Ferreyra et al., 2017).

Guatemala represents one of the lower-middle income countries in Latin America, where inequalities in tertiary attendance are very high. As the figure shows, 70% of seats in the public sector and 80% of seats in the private sector are occupied by those from the wealthiest quintile, and the poorest account for very small proportion of total enrolments in either sector. Nonetheless, as evident throughout the region, this is changing, slightly, in the most recent years, where there seems to have been small increases in the proportion of students from WIQ1 in the public sector.

Finally, the figure shows the remarkable changes in the case of Peru, particularly in the public sector. Peru, like Argentina and Guatemala, is a country where the private sector is more unequal than the public sector. In 2003, roughly 60% of all enrolments in the Peruvian private sector were occupied by students in the top wealth quintile, and roughly 30% of enrolments in the public sector were. This is not unlike Argentina in 2003. Similarly, like Argentina in 2003, less than 10% of enrolments in either sector were occupied by those from the poorest quintile. However, unlike Argentina, there has been a remarkable increase in the representation of the poorest students in Peru's public sector. By 2018, Peru seemed to reach parity in its public sector, such that roughly 20% of students from both the top and bottom quintiles were represented in its public tertiary sector. In fact, as of 2018, a slightly higher proportion of students of all students in public institution were from the bottom quintile than the top, which makes it an outlier in the region, and possibly the world. It is worth noting that the same is not true for the private sector, where the wealthiest continue to be significantly over-represented.

Given changes in the proportions of enrolments for students from different income quintiles, I calculated the wealth parity index (WIQ1/WIQ5) for every year data was available, by sector.

Figure 14 plots the WPI, by sector and year for four countries that represent different patterns occurring within the region. The figure shows that the WPI varies across country, sector and time. Nonetheless, in most cases, the WPI is higher in the public sector, and the WPI in the public sector in particular has been increasing in all four countries. The most noticeable change is the WPI in Peru's public sector, where the 2018 WPI is above 1.0.[7] In Argentina, Guatemala and Peru, the WPI in the private sector has remained relatively stable. In contrast, the WPI in the private sector has clearly increased in Chile, suggesting that relative representation of students from different wealth backgrounds is becoming more equal in the Chilean private sector.

To summarize, in this section, I use SEDLAC data to examine the wealth composition of tertiary enrolments in each sector. The descriptive analysis suggest that the wealthy are more overrepresented in the private sector than the public sector and often substantially so. In other words, wealth-based inequalities in tertiary attendance are higher in the private sector than the public sector in almost all country in the region, with Chile being the noticeable exception. Moreover, a second important finding from this analysis is that over the past 15 years, for which we can trace the composition of enrolments in each sector, students from middle and lower-class backgrounds are increasingly being incorporated into higher education, and those from the wealthiest quintile occupy a smaller proportion of overall seats. Yet, the incorporation of the poor and middle classes is occurring to a greater extent in the public sector than the private sector across the region, with the exception of Chile. Peru also stands out at as a noteworthy outlier; it has made tremendous gains in improving the representation of the poorest students in its public tertiary education system. While it is only possible to conduct this composition analysis for Latin America, where data is clearly disaggregated by sector, it would be interesting to compare these findings to other world

[7] As noted above, for countries such as Peru where values exceed 1.0, I calculated the adjusted WPI as recommended by UIS. The adjustment makes a very small difference, from 1.17 (unadjusted) to 1.15 (adjusted).

regions. There is reason to believe that Latin America, given its long history of elite private higher education (Levy, 1986), may be different than other world regions.

Figure 13: Share of Total Enrolments, by Sector, WIQ and Year, Select Countries

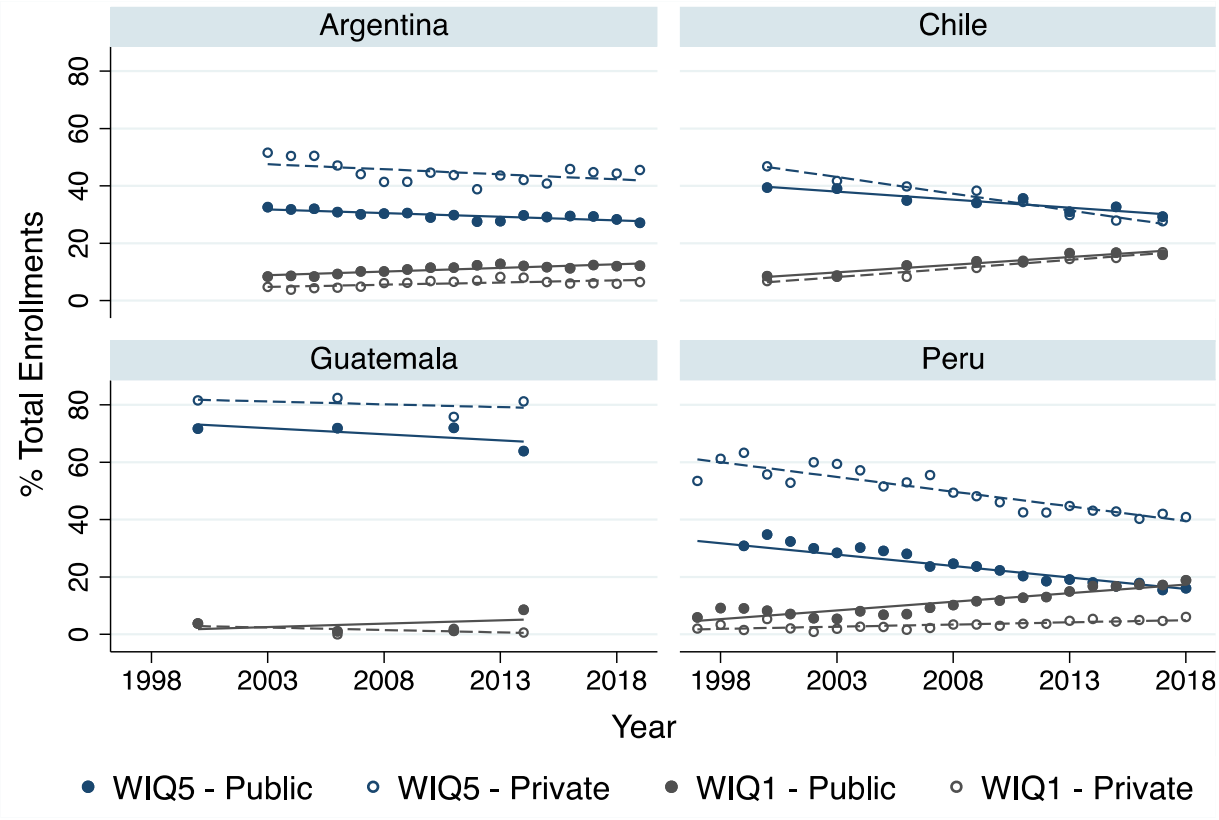
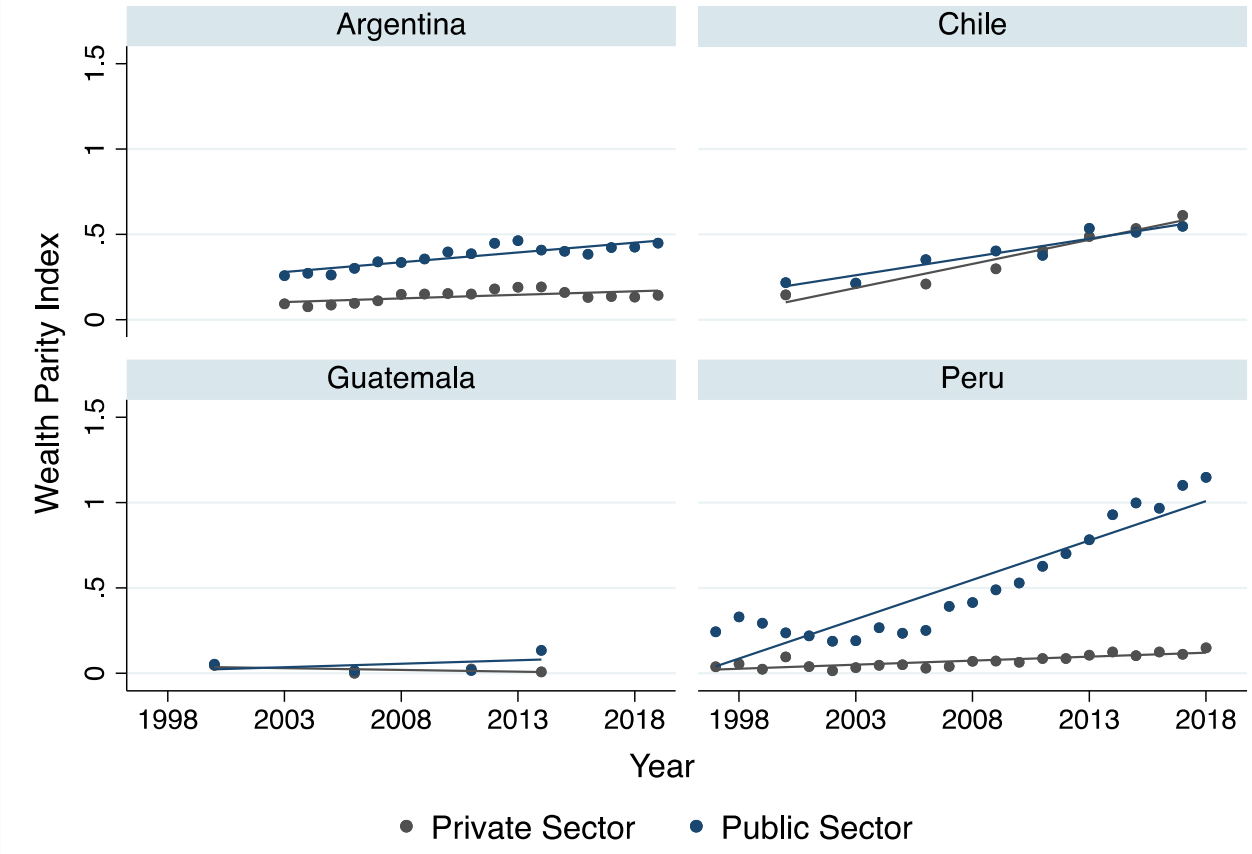


Figure 14: The Wealth Parity Index (WPI) by Sector and Year, Select Countries



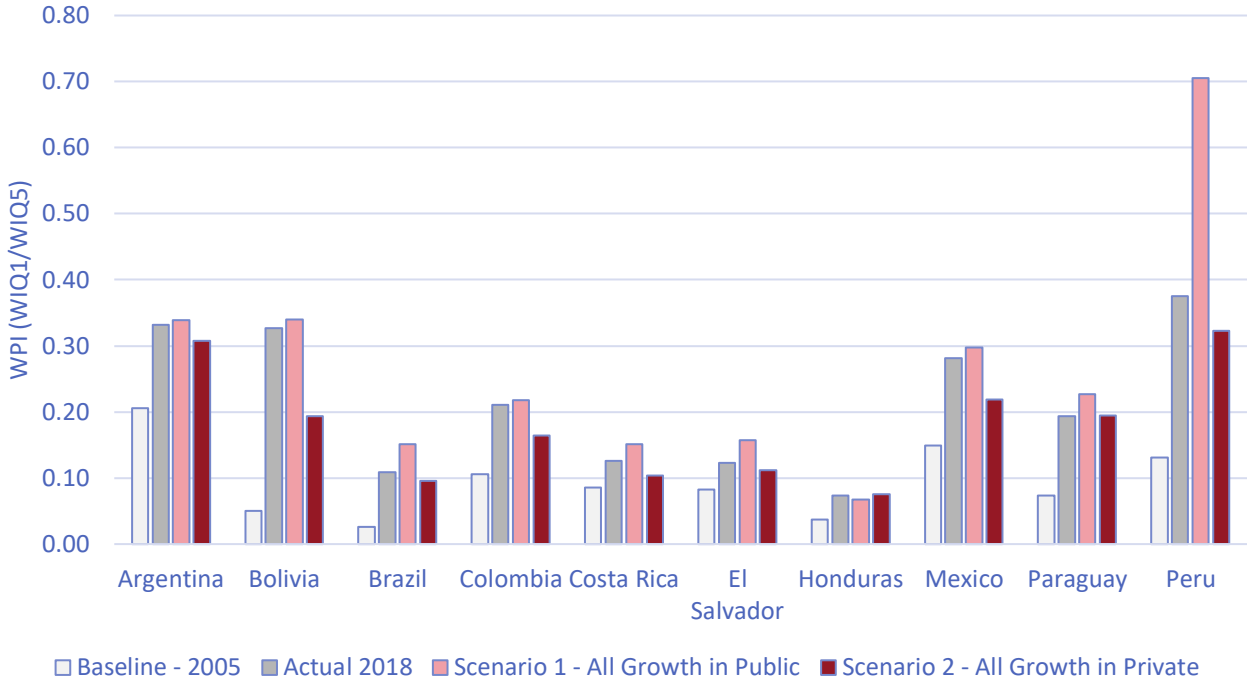
6.1.Simulation Analysis: Latin America

To examine the nuanced relationships between overall expansion, the changing share of private sector enrolments, and overall inequality, I calculated various inequality indicators under different assumptions of system expansion. Carrying out this analysis requires making assumptions about the composition of each sector, and who occupies new spaces in the system; while composition data is not available in WIDE, it is available for countries in Latin America, using SEDLAC data.

To carry out this analysis, I carried out basic simulations to determine what the overall WPI would be under different assumptions of growth, the results of which are depicted in Figure 15. First, I set a baseline year from which to model the various scenarios. I selected the year 2005, which was the earliest year where data was available for over ten countries. I then calculated the actual national WPI (i.e., including both sectors) in both 2005 and 2018, which are shown as the grey bars in Figure 15.

I then calculated two alternative WPIs, under two scenarios: 1) first, I calculate what the WPI would have been if all growth in the system had taken place entirely in the public sector (Scenario 1); and 2) if all growth had taken place entirely in the private sector (Scenario 2). In this analysis, I make an important assumption, namely that the system grew to its 2018 size, which may not be realistic if enrolments in the private sector are helping to facilitate system-wide expansion. The results of this analysis are shown in the blue bars in Figure 15. As is apparent, in most countries, the WPI would be more equal if all growth had taken place entirely in the public sector than how it actually occurred, and much more so than if all growth had taken place in the private sector. This is particularly true for Peru, which as noted above is an outlier. In short, this analysis offers support for the bivariate analyses above, which suggest that expansion of tertiary education systems is an important driving factor for reducing inequalities in both overall attendance (WPI) and disparities in entry (ER gaps) and that if the same degree of expansion could have been accomplished entirely within the public sector, as was accomplished within both sectors over the past 13 years, then it is likely that rates of higher education attendance would likely be more equal.

Figure 15: Simulations for WPI in Latin America, from 2005 Baseline (2018 Data)



7.Bivariate Analysis

In this section, I examine the bivariate relationship between private higher education and inequality in tertiary attendance. To examine trends, I created a series of bivariate graphs for each country, which plots the relationship between the private share of enrolments on the x-axis and the tertiary entry gap, as a measure of inequality in access, on the y-axis. Each data point represents one survey (i.e., a survey conducted in one country-year). The bivariate graphs do not account for other factors, such as calendar year or net attendance; nonetheless, they are useful in depicting the two-way relationship between the size of the private sector (i.e., private share) and the wealth-based disparity in tertiary entry rate. The country plots pointed to at least four different trends, which are shown in Figure 16 as "Types." In the figure, I select a few countries of each type to clearly represent the four trends.

First, in the first set of countries, plotted as "Type 1" and shown in the first row, the inequality indicator (ER gap) discernibly changed, with very little change in the private share of enrolments. In these countries, the bivariate relationships approximate vertical lines. Because each data point represents a survey, irrespective of year, it is not clear from these graphs whether the ER is increasing or decreasing between two points, but the larger message is clear: there is a change in transition rates to tertiary education that seems largely unrelated to changes in the size of the private sector. For example, this relationship would be observed if both the public and private sectors expanded at roughly the same rates, and many of the new seats in tertiary were occupied by those from lower wealth quintiles. This trend was most common in high-income countries (e.g., Austria, Estonia).

Second, in the second row, labelled as Type 2 in the figure, are countries where a larger private share was associated with a lower entry rate gap. In these graphs, there is a negative slope on the best fit lines; however, because the data points are plotted irrespective of year, these plots could represent either an expansion or contraction of the private sector over time. Regardless, they indicate that in the years when the private sector was larger, inequalities

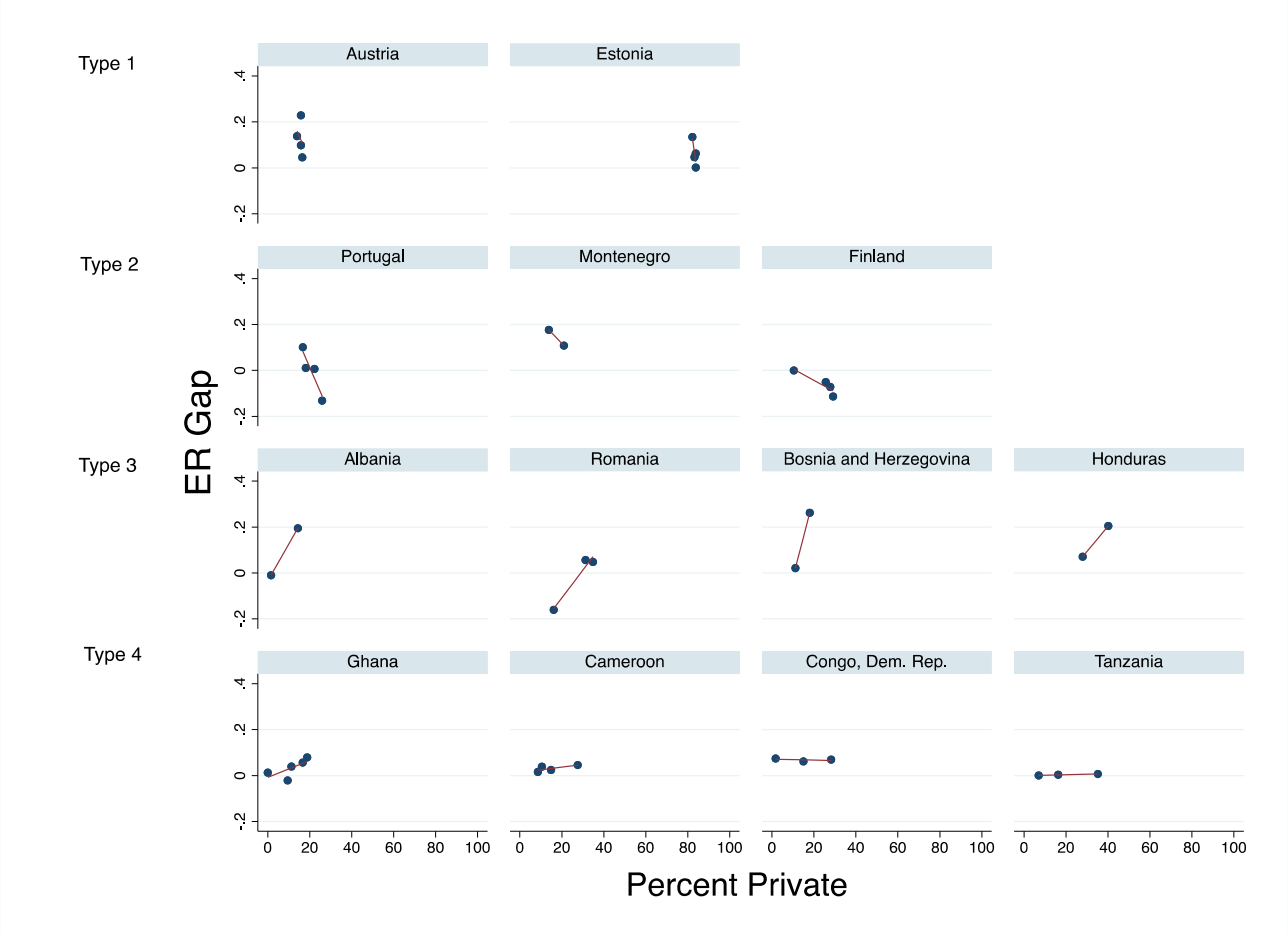
were smaller. This relationship would be observed, for example, if inequalities in entry rates decreased at the same time that the private share of enrolments was increasing. This relationship would be found if the private sector grew at a faster rate than the public sector, and at the same time, many of the new entrants into the higher education system were from lower wealth quintiles. This pattern was found in only a small number of countries, and primarily in high-income countries and Europe (e.g., Portugal, Finland).

Third, in the third row of the figure, labelled as Type 3, depicts the opposite relationship – higher inequalities when the private share is higher. This pattern is depicted as best fit lines with positive slopes, and seems to indicate that inequalities in entry rates were larger when the private share of enrolments was higher. This relationship would occur if the private sector grew at a faster rate than the public sector, and at the same time, many of the new entrants into the higher education system were from top wealth quintile, leading to a higher entry rate disparity. This relationship was found in many countries in Eastern Europe.

Finally, in many low and lower-middle income countries there is a significant change in the private share of enrolments with little change in the inequality indicator (e.g., Cameroon, Tanzania). This trend, depicted in the fourth row as Type 4 appears in the figures as a horizontal line. This relationship would occur if the private sector grew at a faster rate than the public sector, thereby increasing its overall share, and yet, the wealth distribution of new entrants into the overall higher education system remained the same. We know that most of the overall inequality in access to higher education in Sub-Saharan countries is driven by unequal secondary completion rates, and the tertiary entry rate gap is very small. For example, Figure 8 shows a difference in entry rate of only 2-3%. Therefore, in these countries, even large increases in the private share of enrolments could result in little change in the Entry Rate if the expansion of the public sector meant that proportionately equal numbers of secondary completers from lower wealth backgrounds were also able to enrol in tertiary education. Ghana may be an interesting exception to this pattern, where expansion may be exacerbating entry rate disparities.

Combined, the figures show that the relationships between the private share of enrolments and the enrolment gap varies across countries; in other words, there is no overarching global pattern. At the same time, they also seem to indicate possible patterns: the vast majority of countries with a clear positive relationship between the private share of enrolments and wealth-based inequalities in tertiary entry rates were middle-income countries.

Figure 16: Relationship between the Private Share of Tertiary Enrolments and the Entry Rate Gap, in Select Countries



To examine if there were noticeable trends in the relationship between changes in the private share of enrolments and changes in inequality, I examined if change in the private share is associated with change in the tertiary enrolment gap, calculating change as the difference between each observation and its country mean. In

Figure 17, I plot the deviation from the country mean of percent private on the x-axis and the deviation from the country mean in the entry rate on the y-axis, excluding outliers. As the figure shows, the patterns vary across income groups. In high-income countries, there is a slight negative relationship between change in the private share of tertiary enrolments and change in the tertiary entry rate gap. This would occur if the private sector expands at the same time as disparities in tertiary entry rates are declining. In contrast, in middle-income countries, there is a positive relationship – and it is a strong positive relationship in upper-middle income countries. This finding reflects the country-specific findings above, where both the private share of enrolments and inequalities in tertiary entry rates increased over time in upper-middle income countries such as Romania and Albania. This positive relationship suggests that the private sector is expanding at the same time as disparities in tertiary entry rates increase. In low-income countries, there is no relationship between the private share expanding and the entry rate disparity. This figure corresponds to country-specific trends above, including Tanzania, the Democratic Republic of Congo and Cameroon. This trend suggests that even as the private sector expands – as it clearly has in some low-income countries, it is not associated with changing proportional representation. This could happen if the proportion of those from different quintiles represented in the overall tertiary system does not change, even as the private sector expands.

These bivariate relationships are not causal, and must be interpreted with caution. Wealth-based disparities in tertiary entry rates are determined by both the public and private sector. Therefore, decreases in the ER gap in high-income countries could be a result of the public sector. However, they could also be the result of a private sector that is expanding to serve students from the poorest wealth quintile.

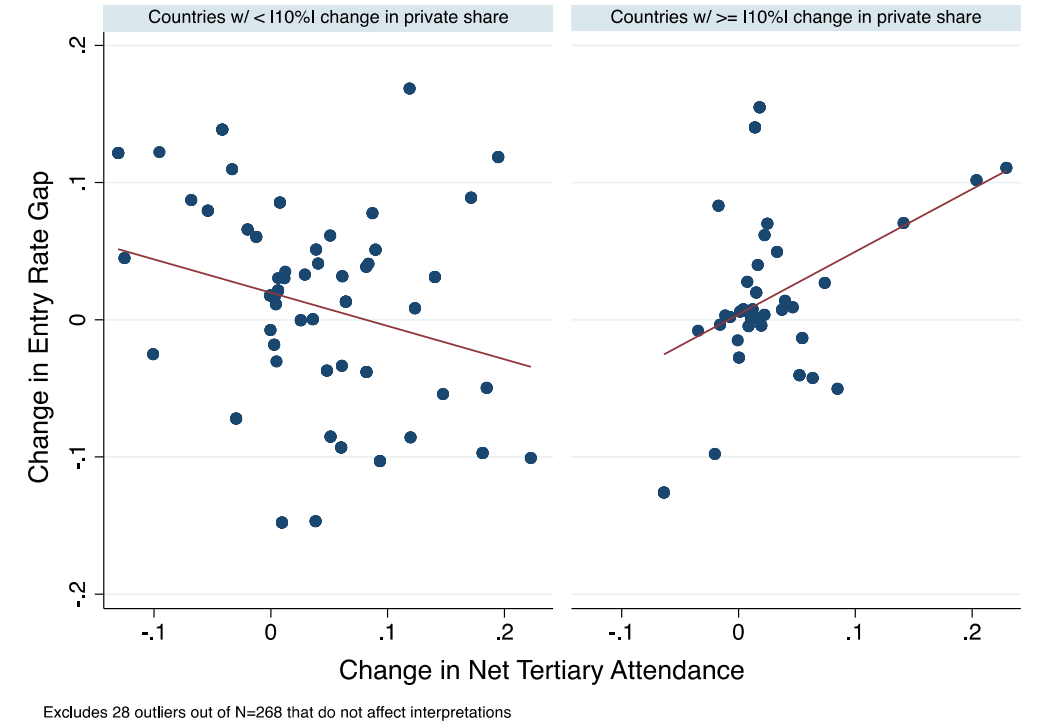
Because the relationships identified above are also sensitive to expansion in the public sector, there is a need to consider the possible equalizing role that the expansion of the overall higher education system plays in these dynamics. This requires examining how overall tertiary enrolment, the private share, and inequality are inter-related. To analyse these trends, I graphed how the change in net tertiary attendance is related to the change in the tertiary entry rate gap differently for three sets of countries: those where the absolute change in private share is less than 10.0, and those where the absolute change in the private share is greater than 10.0. **Error! Reference source not found.** shows these relationships in these two sets of countries, excluding a few major outliers that do not change the direction.

The left panel of the figure shows the relationship between attendance and inequality in countries where the private share did not change much (<10%) over ten years. In these countries, there is actually a negative relationship between net tertiary attendance (i.e., access) and the entry rate gap (i.e., inequality). In other words, as overall access increased, inequalities in access due to differential entry rates decreased. This is the relationship is not surprising – it suggests that as the higher education system expands to include more young people, greater proportions of young people from lower and middle classes who completed secondary school are able to attend higher education, and therefore, the gap between the wealthiest and everyone else declines. Meanwhile, the right panel of the figure shows the opposite relationship: in countries where there has been a large change in the size of the private sector (>10%), the opposite is true. Even when access to HE has increased, it is not clearly associated with declines in the entry rate gap in these countries, and in fact seems to be positively associated with an ER gap.

Combined, the figures support the idea that increases in the private share of enrolments have different relationships with inequality in different countries, and appears to be positively associated with inequalities in upper middle-income countries in particular. At the same time, growth of the private sector seems to be negatively associated with ER gaps in high-income countries and has only a slight positive relationship with lower middle-income countries and almost no relationship, positive or negative, in low-income countries. Meanwhile, the figures also suggest that the private sector may be playing a role in maintaining or even exacerbating inequalities in HE attendance in some countries.

Figure 17: Relationship between Change in Private Share and Change in Entry rate Gap, by Country Income Group

Figure 18: Relationship between Change in Tertiary Attendance and Change in Entry rate Gap, by Change in Private Share



Excludes 28 outliers out of N=268 that do not affect interpretations

8.Regression Analysis

To examine if there is a statistically significant relationship between the size of private sector and the extent of inequality, after controlling for other factors, I carry out a series of cross-sectional and fixed-effects regression models on all countries for which there is data. In the first set of regression models, I conduct a linear regression (OLS) on a cross-section of the dataset, including only the most recent data for each country. In this first set of models, the unit of analysis is the country-year. The cross-sectional analysis allows us to compare countries to one another, but not examine changes within the same country. To examine how change in the private share is associated with changes in inequality within the same country, we need to examine data from the same country over multiple time periods. Therefore, in the second set of models, I analyze the full panel dataset. Because country observations in the panel dataset are not independent, I use fixed-effects models, which allow for a country-specific error term. As observations grouped within countries over time, the unit of analysis in the fixed-effects models is the country-year. Fixed-effects models examine variation within countries over time, rather than between countries, which allows us to examine how enrolment ratio changes as the private share of enrolments does.

Dependent Variables

For each set of regression, I analyze three dependent variables, which each captures a different method for conceptualizing and calculating inequalities in attendance: the wealth parity index, the concentration index and entry rate (ER) gap. As with the descriptive analyses conducted above, I calculate the Wealth Parity Index (WPI) as the ratio between the attendance rate of the poorest 40% (WIQ1 & 2 combined) as compared to the attendance rate of the wealthiest quintile (WIQ5).

Key Predictor

The key predictor variable in the analysis is the private share of tertiary enrolment, as reported to UNESCO Institute of Statistics, and modified for key countries by PROPHE. As discussed above, for missing data, I interpolate and extrapolate within the same country over time. To understand if the relationship between the size of the private tertiary sector and attendance varies across countries, I also interact private share with country income group.

Covariates

In addition to private share, I also include a number of important covariates, namely: GDP per capita (logged) as a proxy for national wealth and state capacity; and 2) national tertiary attendance rate, which is particularly important in margin-sensitive calculations of inequality (i.e., WPI and CI). Because the relationship between national tertiary attendance and inequality may be non-linear, I also add in its square term.

GDP per capita (logged): A consistent finding in the literature on tertiary access is that overall tertiary enrolment rates are positively associated with a country's national wealth, measured by GDP per capita (Yang & McCall, 2014; Yu & Delaney, 2016). To control for countries' economic development, I include an indicator of a country's gross domestic product (GDP) per capita, logged. This data comes from the World Development Indicators.

National tertiary attendance: To control for the fact that most indicators of inequality are highly sensitive to overall attendance, I also control for overall tertiary attendance, as measured by the national average calculated from household surveys in WIDE. I also include the squared term of national tertiary attendance to account for the non-linear relationship between overall attendance and inequality indicators.

Table 12,

Table 13 and

Table 14 show the number of observations and countries represented in each set of regression models.

8.1. Variables and Regression Models

Table 15, Table 16 and Table 17 provide a set of linear regression models for the three different dependent variables (i.e., WPI, CI and Entry Rate Gap) with robust standard errors. First, Table 15 shows models for the WPI (calculated as bottom 40%/top 20%). For a few European countries, the WPI is over 1.15, which may reflect the fact that many students in these European countries are captured in the EU-SILC surveys as living in their own households and are classified as poor because they have little current income. In cases where the WPI is over 1.0, I use an adjusted WPI, as described in Table 1. Table 16 shows the cross-sectional regression models for the CI, and Table 17 shows the cross-sectional regression models for disparities in entry rates into tertiary.

Table 18,Table 19, and Table 20 show the results from the fixed-effects regression models for the three different dependent variables. In each of the tables, the first model (a) includes a variable for logged GDP per capita. The second model (b) adds in a variable for national tertiary attendance rate and the third (c) adds in the squared term of national tertiary attendance. The fourth model (d) adds in the key predictor, the indicator for the private share. Finally, the fifth model (e) interacts private share with an indicator of the country's income group, grouping together lower middle and low-income countries due to limited observation in each.

Table 12: Observations in Cross-Sectional Regression Models

Dependent Variable	N
Wealth Parity Index – Attendance	108
Concentration Index - Attendance	108
Entry Rate Gap – Attendance	107

Table 13: Observations in Panel Regression Models

Dependent Variable	N	Country N
Wealth Parity Index – Attendance	279	109
Concentration Index – Attendance	279	109
Entry Rate Gap – Attendance	274	108

Table 14: Summary Statistics on Covariates (Cross-Section-Most Recent Year)

Variable	Mean	SD	Min	Max
GDP per capita (logged)	9.03	1.16	6.74	11.09
National Tertiary Attendance (%)	26%	22%	0%	77%
Private Share (%)	28%	21%	0%	96%
High-Income (%)	25%	44%	0%	100%
Upper Middle Income (%)	22%	42%	0%	100%
Lower Middle Income (%)	31%	47%	0%	100%
Low Income (%)	21%	41%	0%	100%

8.2. Cross-Sectional Regression Findings

This section presents the results from the cross-sectional regression analysis, with one table for each of the three dependent variables: WPI, CI and ER gap. I choose not to model the log odds ratio as a dependent variable due to the limitations calculating the OR for the many countries that have zero percent of students from the bottom two quintiles in tertiary education.

In Table 15, the dependent variable is the wealth parity index and the key predictor variable is the private share of enrolments. Model 1a shows a statistically significant positive association to between GDP per capita and the wealth parity index, as expected. However, after controlling for the national tertiary attendance term (Model 1b), and its squared term (Model 1c), the coefficient on GDP per capita decreases, but remains significant. The first three models suggest that WPI is strongly positively associated with overall access to tertiary education, which is in turn positively associated with national wealth, as expected. Model 1d adds in the variable for private share, and finds a statistically significant negative relationship, suggesting the private share decreases the WPI. However, when the private share of enrolments is interacted with income group, we find that the cross-national average is likely erasing differences across countries from different income groups. Specifically, Model 1e shows a negative coefficient on private share in both high income and upper middle-income countries, indicating that countries with higher proportion of students in the private share seem to have higher levels of inequality. Meanwhile, the opposite is true in low-income countries, where countries with higher proportions of students in the private sector have higher WPIs, indicating greater inequality. Model 1e finds that the coefficients on private share in both upper-income and low-income countries are statistically significant. This is true even after controlling for overall national mean net attendance. The limitation with this data is that with a cross-sectional analysis, we are only able to examine the relationship between countries for one time period, namely their most recent data point.

Table 16 presents the results from the cross-sectional regression analysis to model factors associated with the Concentration Index. The dependent variable is the Concentration Index and the key predictor variable is the private share of enrolments in tertiary. As above, the cross-sectional analysis allows us to compare countries to one another, but not examine changes within the same country. Model 2a shows a strong statistically significant negative association to between GDP per capita and the concentration index, as expected. This suggests that the concentration of educational opportunities among the wealthy is lower in countries with higher GDP per capita. The size of this relationship decreases, but the coefficient remains significant after controlling for the national tertiary attendance term (Model 2b), and its squared term (Model 2c). The first three models suggest that the CI is strongly negatively associated with overall access to tertiary education and with national wealth, as expected. Model 2d adds in the variable for private share, and finds no statistically significant relationship. However, when the private share of enrolments is interacted with income group, we find that the cross-national average in Model 2d seems to erase cross-national differences. Specifically, Model 2e shows a positive coefficient on private share in both high income and upper middle-income countries, indicating that countries with higher proportion of students in the private share seem to have higher levels of inequality, as measured by the CI. Meanwhile, the coefficients on private share are negative but not statistically significant in lower middle-income and low-income countries. This finding differs somewhat from that in Model 1e, where the coefficient on private share in low-income countries was statistically significant and actually suggested that countries with a greater private share of enrolments had higher levels of parity. The CI measures inequalities across all five concentration wealth income quintiles, rather than focusing on the top and bottom ends of the distribution, which may be a reason for this difference. However, the finding and

interpretation on upper-middle income countries remains the same; both the WPI and CI find that countries with a larger private share of enrolments in upper middle-income countries are more unequal. As with Table 15, this table presents regressions using only the most data from each country, which means it cannot examine change over time.

Table 15: Cross-Sectional Regression Models for Adjusted Wealth Parity Index (WIQ1&2/WIQ5)

	Model 1a	Model 1b	Model 1c	Model 1d	Model 1e
GDP per capita (logged)	.24***	.11**	.12***	.12***	.19***
	(.02)	(.04)	(.04)	(.04)	(.05)
Net Tertiary Attendance (%)		.8***	.59**	.64**	.77**
		(.16)	(.28)	(.28)	(.3)
Net Tertiary Attendance ^2 (%)			.27	.16	-.20
			(.37)	(.38)	(.47)
Private Share (%)				-.14*	
				(.08)	
Private Share x High-Income					-.19
					(.21)
Private Share x Upper Middle					-.39***
					(.14)
Private Share x Lower Middle					-.01
					(.1)
Private Share x Low Income					.48***
					(.16)
Constant	-1.84***	-.93***	-.97***	-.88***	-1.58***
	(.2)	(.35)	(.34)	(.31)	(.44)
N	108	108	108	108	108
R-squared	.59	.67	.67	.68	.73

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Notes: Adjusted WPI used when WPI>1.0; all models with private share also include a binary variable indicating whether private share was interpolated or not.

Finally, I also carry out cross-sectional regression analysis to model inequality as measured by the Entry Rate gap, as shown in Table 17. As with the models above, the cross-sectional analysis allows us to compare countries to one another, but not examine changes within the same country. Model 3a shows no relationship between GDP per capita and the ER gap. This lack of a relationship remains after controlling for the national tertiary attendance term (Model 3b), but, after including its squared term (Model 3c). Instead, there is a strong, significant relationship between overall HE attendance rates and the ER gap. The coefficient on national tertiary attendance is positive but its squared term is negative, suggesting a non-linear relationship that initially worsens and then decreases at higher levels of attendance. The first three models suggest that the ER gap exhibits a parabolic relationship with overall access to tertiary education (i.e., an inverted U shape) – initially, the ER gap is higher in countries with higher levels of national HE attendance. However, in countries with very high levels of tertiary attendance, the ER gap begins to decrease. These findings map the descriptive analyses, which showed the ER gaps to be largest in middle income countries.

Model 3d adds in the variable for private share, and finds no statistically significant relationship. However, when the private share of enrolments is interacted with income group, we find that the cross-national average in Model 3d is again erasing two contrasting cross-national differences. Specifically, Model 3e shows positive and statistically significant coefficient on upper middle-income countries, indicating that in these countries, the private share is positively associated with inequality. In contrast, the coefficients on private share are negative and statistically significant in low-income countries, indicating that at least in some low-income countries, a larger private share is associated with a smaller ER gap.

Table 16: Cross-Sectional Regression Models for Concentration Index

	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e
GDP per capita (logged)	-.18***	-.10***	-.07***	-.07***	-.09***
	(.01)	(.02)	(.02)	(.02)	(.03)
Net Tertiary Attendance (%)		-.57***	-1.34***	-1.37***	-1.39***
		(.09)	(.16)	(.17)	(.17)
Net Tertiary Attendance ^2 (%)			.99***	1.02***	1.10***
			(.19)	(.20)	(.23)
Private Share (%)				.06	
				(.05)	
Private Share x High-Income					.11
					(.09)
Private Share x Upper Middle					.16**
					(.07)
Private Share x Lower Middle					-.03
					(.07)
Private Share x Low Income					-.11
					(.11)
Constant	2.04***	1.39***	1.24***	1.21***	1.45***
	(.1)	(.17)	(.15)	(.14)	(.21)
N	108	108	108	108	108
R-squared	.72	.81	.83	.83	.84

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Notes: All models with private share also include a binary variable indicating whether private share was interpolated or not.

Table 17: Cross-Sectional Regression Models for Entry Rate Gap (WIQ5: All Others)

	Model 3a	Model 3b	Model 3c	Model 3d	Model 3e
GDP per capita (logged)	.01	.02	-.02	-.01	-.04*
	(.01)	(.02)	(.02)	(.02)	(.02)
Net Tertiary Attendance (%)		-.05	.84***	.82***	.75***
		(.09)	(.16)	(.17)	(.17)
Net Tertiary Attendance ^2 (%)			-1.12***	-1.09***	-.97***
			(.22)	(.23)	(.27)
Private Share (%)				.05	
				(.04)	
Private Share x High-Income					.11
					(.08)
Private Share x Upper Middle					.12*
					(.07)
Private Share x Lower Middle					-.01
					(.04)
Private Share x Low Income					-.14**
					(.07)
Constant	0	-.05	.13	.11	.33*
	(.07)	(.13)	(.12)	(.13)	(.16)
N	107	107	107	107	107
R-squared	.01	.02	.24	.25	.31

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Notes: All models with private share also include a binary variable indicating whether private share was interpolated or not.

To summarize, the three sets of cross-sectional regression models show very clear and consistent findings that wealthier countries and countries with expanded higher education systems have lower levels of inequality overall in tertiary attendance. Meanwhile, after accounting for differential rates of secondary completion rates, gaps in the transition to tertiary (ER) are largest in middle income countries, but begin to decline with further expansion. In all three sets of models, the private share of enrolments is neither large nor a statistically significantly associated with inequality when included in the regression models, suggesting that cross-nationally there is not a clear relationship. However, when we examine the role that the private share of enrolments plays in different groups of countries, namely those of different income levels, by interacting private share with country income group, we do find that it tends to be associated with higher levels of inequality, as measured by all three indicators of inequality, in upper middle-income countries, and lower levels of inequality in low-income countries, according to the WPI. However, these relationships are not robust across all indicators of inequality, and may reflect the distribution of countries represented. Therefore, in the subsequent set of models, I examine how change in the private share of enrolments is specifically associated with change in inequality in the same country.

9.Fixed-Effects Regression Models

This section reports findings from fixed-effects regression models. As with the cross-sectional models, I examine three dependent variables: WPI, CI and ER gap. I again choose not to model the log odds ratio as a dependent variable due to the limitations calculating the OR for the many countries that have zero percent of students from the bottom two quintiles in tertiary education.

In Table 18, the dependent variable is the wealth parity index and the key predictor variable is the private share of enrolments. Model 4a shows a statistically significant positive association to between GDP per capita and the wealth parity index, as expected. However, after controlling for the national tertiary attendance term (Model 4b), and its squared term (Model 4c), the coefficient on GDP per capita decreases and is no longer significant. The first three models suggest that WPI is strongly positively associated with overall access to tertiary education and with national wealth, as expected. Because the squared term of national tertiary attendance is not significant, I remove it from subsequent models. Robustness checks show that the coefficients on private share are not changed in sign or significance by its inclusion or not. Model 4d adds in the variable for private share, and finds no statistically significant relationship. However, when the private share of enrolments is interacted with income group, the cross-national average erases differences across countries from different income groups. Specifically, Model 4e shows a positive coefficient on private share in high income and a negative coefficient in upper middle-income countries. Meanwhile, the coefficients on private share in lower middle income and low-income countries are not significant. These findings reflect the descriptive analyses depicted in Figure 16 – where the relationship between the change in the private sector and the change in inequality (as measured by ER) was negative in high-income countries, positive in upper middle-income countries, and had no relationship in lower-middle and low-income countries. They suggest that as the private share of enrolments increases in high-income countries, the system is also incorporating greater numbers of those from lower wealth backgrounds, thereby bringing down the WPI. However, the reverse relationship seems to be true in upper middle-income countries, where the results would suggest that an increasing share of enrolments in the private sector is associated with increasing enrolments among the wealthy, relative to the bottom two quintiles. Table 19 presents the results from the fixed-effects regression models for the Concentration Index. The dependent variable is the Concentration Index and the key predictor variable is the private share of enrolments in tertiary. The results from these models are very consistent with both the findings in Table 16 and Table 18 – we see that the CI is negatively associated with national wealth and national tertiary attendance. Model 5a shows a statistically significant negative association to between GDP per capita and the CI, as expected, indicating that the concentration of tertiary educational opportunities among the wealthy decreases as a country's GDP per capita increases. This relationship remains statistically significant in all models. We also note that national tertiary attendance (Model 5b) and its squared term (Model 5c) point to a negative relationship between net attendance and CI, but the positive and significant coefficient on the squared term points to plateauing relationship. The first three models suggest that the CI is strongly negatively associated with overall access to tertiary education and with national wealth, as expected.

Model 5d adds in the variable for private share, and finds no statistically significant relationship. However, when the private share of enrolments is interacted with income group, the model shows that the cross-national average in Model 5d is erasing cross-national differences. Specifically, Model 5e shows a positive, but not significant, coefficient on private share in upper middle-income countries, indicating that as the private share increases in the same country, the country also experiences higher levels of inequality, as measured by the CI. Meanwhile, the coefficients on private share are negative but not statistically significant in high-income countries and positive but not significant in lower-middle and low-income countries. These findings partially align to Model 4e, where the coefficient on private share in upper-middle income countries also found that countries with larger private sectors were associated with higher inequalities. The negative relationship in high-income countries is not statistically significant in these models, but the direction of the relationship is the same.

Table 18: Fixed Effects Regression Models for Wealth Parity Index (WIQ1&2/WIQ5)

	Model 4a	Model 4b	Model 4c	Model 4d	Model 4e
GDP per capita (logged)	.11***	.08	.08*	.08*	.08
	(.04)	(.05)	(.04)	(.05)	(.05)
Net Tertiary Attendance (%)		.28	.19	.29	.35
		(.28)	(.5)	(.29)	(.29)
Net Tertiary Attendance ^2 (%)			.09		
			(.51)		
Private Share (%)				-.05	
				(.1)	
Private Share x High-Income					.68*
					(.37)
Private Share x Upper Middle					-.82**
					(.38)
Private Share x Lower Middle					-.07
					(.09)
Private Share x Low Income					-.07
					(.05)
Constant	-.66*	-.43	-.47	-.48	-.48
	(.37)	(.39)	(.35)	(.42)	(.43)
N	279	279	279	279	279
BIC	-808.34	-810.15	-804.62	-799.28	-807.05

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Notes: Adjusted WPI used when WPI>1.0; all models with private share also include a binary variable indicating whether private share was interpolated or not.

As the tables show, the regression models examining the CI differ from those modelling the WPI in important ways. The key difference is that none of the coefficients on private share are significant in the CI models, suggesting a change in the private share is not statistically associated with a change in inequality. The differences between the models raises the question of whether a lack of significance on the coefficients for the CI are due to potential issues with data, such as country representation, or whether they are accurately reflecting a weak relationship between change in the private share and change in the CI. On one hand, the direction of coefficients in Table 19 align to those on WPI in Table 18, suggesting similar associations. Nonetheless, there are important differences in how the WPI and the CI define and measure inequality that could also explain the differences in regression results. Specifically, the WPI in this report compares attendance rates in the wealthiest 20% to the poorest 40%; in contrast, the CI also takes into account the middle 40% to look at how concentrated higher education attendance is across the entire population. The fact that private share is not significantly associated with the CI may actually suggest that the private share may be benefitting not only the wealthiest 20%, but may also be associated with attendance among the wealthiest 40% or even 60% of the population, thereby leading to less 'concentration' of tertiary access overall. An important area for future research will involve a more detailed examination of how changes in the private share are associated with higher education attendance among the middle classes (i.e., the middle 60% of a country's the wealth distribution).

Table 19: Fixed Effects Regression Models for Concentration Index

	Model 5a	Model 5b	Model 5c	Model 5d	Model 5e
GDP per capita (logged)	-.12***	-.10**	-.07	-.08**	-.08*
	(.04)	(.04)	(.04)	(.04)	(.04)
Net Tertiary Attendance (%)		-.15	-.74	-.80*	-.96**
		(.12)	(.45)	(.45)	(.39)
Net Tertiary Attendance ^2 (%)			.61	.67	.80**
			(.42)	(.42)	(.37)
Private Share (%)				.09	
				(.06)	
Private Share x High-Income					-.21
					(.15)
Private Share x Upper Middle					.56
					(.35)
Private Share x Lower Middle					.04
					(.11)
Private Share x Low Income					.10
					(.09)
Constant	1.45***	1.33***	1.09***	1.21***	1.16***
	(.37)	(.37)	(.35)	(.32)	(.33)
N	279	279	279	279	279
BIC	-973.95	-972.05	-973.79	-965.42	-960.69

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Notes: All models with private share also include a binary variable indicating whether private share was interpolated or not.

Finally, I also carry out a fixed effects regression analysis to model inequality as measured by the Entry Rate gap, as shown in Table 20, which allow us to examine how the ER gap changes within a country as the private share changes, after accounting for the role of other factors. Model 6a shows a statistically significant positive association to between GDP per capita and the ER gap, which suggests that before controlling for other factors, the ER gap increases as a country's GDP per capita increases. This relationship remains significant after controlling for the national tertiary attendance term (Model 6b), but, after including its squared term (Model 6c), the positive coefficient on GDP per capita is no longer significant. As in Model 3c, the coefficient on national tertiary attendance is positive but its squared term is negative, suggesting a non-linear relationship such that the ER gap initially increases but eventually decreases at higher levels of incorporation. In short, as in the cross-sectional analysis, the first three fixed effects models also suggest that the ER gap exhibits a parabolic relationship with overall access to tertiary education (i.e., an inverted U shape) – initially, the ER increases as national wealth increases, presumably because secondary completion rates increase eligibility for tertiary, but additional seats within the higher education system are not equally distributed. However, at high levels of tertiary attendance, the ER begins to decline. This is the relationship that we would expect to see if the wealthy were the first to take advantage of expansion in the tertiary system, but that continued expansion facilitated access of those from lower wealth quintiles.

Table 20: Fixed Effects Regression Models for Entry Rate Gap (WIQ5: All Others)

	Model 6a	Model 6b	Model 6c	Model 6d	Model 6e
GDP per capita (logged)	.06**	.05*	.02	0.0	.02
	(.03)	(.03)	(.03)	(.03)	(.03)
Net Tertiary Attendance (%)		.06	.6*	.54*	.24
		(.14)	(.31)	(.31)	(.27)
Net Tertiary Attendance ^2 (%)			-.56*	-.51	-.26
			(.32)	(.32)	(.3)
Private Share (%)				.06	
				(.07)	
Private Share x High-Income					-.34
					(.22)
Private Share x Upper Middle					.85***
					(.22)
Private Share x Lower Middle					.11
					(.07)
Private Share x Low Income					0.0
					(.03)
Constant	-.46**	-.41*	-.19	-.07	-.15
	(.23)	(.25)	(.25)	(.26)	(.25)
N	274	274	274	274	274
BIC	-1036.44	-1031.58	-1034.07	-1026.02	-1050.22

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Notes: All models with private share also include a binary variable indicating whether private share was interpolated or not.

Model 6d adds in the variable for private share, and finds the coefficient is small and there is no statistically significant relationship. However, when the private share of enrolments is interacted with income group, Model 6e shows a negative but not statistically significant coefficient on private share in high-income countries, and a positive statistically significant coefficient in upper-middle-income countries. Meanwhile, the coefficients on private share are not statistically significant in lower middle-income and low-income countries. These results support prior findings that the growth of the private sector may exacerbate inequalities in upper middle-income countries, specifically by disproportionately facilitating access to tertiary among wealthy secondary completers. Meanwhile, this does not seem to be the case in low-income countries or lower-middle income countries, where there is no relationship. Nor does it appear to be the case in high-income countries where various models suggest there may actually be a negative relationship between the private sector growth and overall inequality. This would be the case if the private sector is making tertiary education available to presumably poorer populations who would otherwise be excluded.

To summarize, despite some small differences in the interpretations, the fixed effects regression models point to a very similar pattern: expanding the private share of tertiary enrolments is associated with more equal attendance rates in high-income countries but less equal attendance rates in upper-middle-income countries, while seeming to have little relationship to inequality indicators in low and lower-middle-income countries. An important takeaway is that private sector enrolments is associated with different trends, depending on the country income group and its national tertiary attendance rates.

10.Discussion and Conclusion

This report points to a number of important findings concerning inequalities in access to tertiary education. First, the descriptive analyses show that wealth-based inequalities in tertiary attendance and completion rates are large; in most countries, they far surpass inequalities in attendance and completion rates at the primary and secondary level, indicating we are a long way from meeting the SDG goal of equality. However, across the board, the findings point to a significant expansion in access to higher education, which includes growing attendance rates among the poorest. Unsurprisingly, overall attendance and completion rates are highest among high-income countries and remain low in low-income countries. According to the data, the proportion of young people from the poorest quintile attending tertiary education in high-income countries is actually higher than the proportion of those from the wealthiest quintile attending tertiary education in low-income countries, pointing to vastly different opportunities for tertiary education cross-nationally.

Nonetheless, all three indicators of inequality suggest that wealth-based inequalities are declining as overall access to tertiary increases. For most world regions and income groups, the size of inequalities have declined in surveys conducted after 2010 compared to those conducted before. The one world region where this does not appear to be the case is sub-Saharan Africa, where inequalities remain both very large and quite stable, and inequalities in two-year tertiary completion may be worsening, given the fact that gains in access are primarily benefiting students from the wealthiest quintile.

Secondly, the decomposition analyses suggest that across all countries, about 41% of the overall disparity in tertiary attendance between the wealthiest (WIQ5) and all others is due to their differential entry rates into tertiary education, while 59% is due to disparities in secondary completion rate. That said, this proportion varies substantially across countries, and is largest in upper middle-income countries – and particularly, in Latin America. Disparities in ER are also large in East Asia; however, WIDE includes few datasets from East Asia, and future research can follow up on the size of ER disparities, as more data is available from East Asian countries.

Findings from the regression analyses suggest that changes in the size of the private sector are not associated with overall inequalities in tertiary attendance in many parts of the world, particularly in low-income and lower-middle-income countries, where the relationship between the private share of enrolments and inequality is consistently flat and not statistically significant. The descriptive analyses suggest that this is likely because tertiary attendance rates remain quite small in low-income countries, and inequalities in tertiary attendance are largely determined by unequal secondary completion rates.

In contrast, both the descriptive and regression results offer support for the idea that private sector expansion may be associated with exacerbated inequalities in upper middle-income countries. I interpret this finding as suggesting that in upper-middle income countries, where growing proportions of young people are graduating secondary school and hence eligible for tertiary education, the tuition-dependent private sector is disproportionately expanding access to the wealthiest. This interpretation is supported by findings on sectoral composition in Latin America, where students from the wealthiest quintile are even more concentrated in the private sector than the public sector in every country except for Chile. In contrast, the analyses suggest that private sector expansion in high-income countries may actually be associated with expanding access among less advantaged groups, at least relative to the wealthiest cohort, although these findings are less robust to model specification. This interpretation would be in line with a low-fee private sector. For example, in high-income countries, where mass access to tertiary education is already available, the private sector may actually be serving low-income students who would not be in the public system. Future studies should examine the different possible mechanisms or nation-specific factors at work.

Moreover, a key finding of this report is that expanding access to tertiary education is critical to improving overall inequalities in access: as a country expands its tertiary education system, greater proportions of the economically disadvantaged are able to enrol and complete tertiary education. While their participation rates are not yet equal to those of the economically advantaged, expansion is strongly associated with both more inclusion and declining inequality around the world over the past two decades.

RECOMMENDATIONS

This report identifies a number of recommendations for future research, policy and practice:

Improve Data on Inequality and Private Higher Education

1. This analysis was only possible thanks to the excellent data on inequality in higher education available in WIDE. Conversely, the scope of the analysis is limited by a lack of data on inequalities in many countries. For example, inequality data is notably lacking for numerous populous countries in East Asia. In the future, the GEM team should explore the possibility of adding additional household surveys, possibly from national surveys, to expand the global coverage.
2. A major concern with analyzing data on the private sector in higher education is the lack of a common and standardized definition and measure of the private sector cross-nationally. This lack of common definition is natural, as national higher education systems vary significantly, and "what counts" as private is often determined by national histories and laws. In response, UIS's approach to the question of private higher education prioritizes a single cross-national definition based on the idea of control. However, this definition does not always reflect the long-standing widely shared understandings of 'public' and 'private' that are used by scholars and officials within those contexts. This practice creates more confusion than clarity. This report suggests that UIS consider reporting two indicators for the private share of higher education, including one that reflects national definitions and laws of private higher education.

Developing Pathways for More Equal Access to Tertiary Education

3. An important finding from the analysis of tertiary attendance and completion is that access to higher education is increasing worldwide, and that for the most part, this is reducing overall inequalities in access. Similarly, the distribution analysis conducted in Section 4.4 shows that worldwide, gaps in secondary completion remain a larger source of inequality than are inequalities in the transition to tertiary. A clear recommendation for reducing inequalities in tertiary education is to continue to improve access to and completion from secondary school.
4. At the same time, the analyses also show that wealth-based inequalities in the transition to tertiary education among secondary completers, are large in many parts of the world, particularly upper middle-income countries. More research and analysis are needed to unpack the factors associated with unequal transition rates, particularly in upper middle-income countries. Policy recommendations for addressing these ER gaps will necessarily depend on the factors driving these disparities, but may include expanding scholarships and loans or more flexible study options that permit students to study and work simultaneously. Moreover, this report finds support for the idea that the private sector may be perpetuating or exacerbating unequal transition rates for the wealthiest quintile of students, and urges further analysis to this issue as a particular concern.
5. Finally, this report also finds support for the idea that in high income countries, private enrolments are associated with lower overall inequalities in access to tertiary education. This means that in these countries, the private sector may be facilitating additional access to tertiary. These findings are overwhelmingly based on data from Europe, and it would be useful to explore whether these same relationships hold in other national contexts, and to explore further who specifically is benefiting and from what types of tertiary education in these contexts.

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APPENDICES

Appendix A: Data Inclusion and Exclusion Notes

I examined consistency of estimators across surveys and time periods for each countries. Below I explain decisions made for each country that was excluded from the analysis.

EU-SILC – 2-Year and 4-Year TCR Identical

In all EU-SILC datasets, 2-year TE comp and 4-year comp TE are identical, which is a problem because I'm not sure why or how these are being calculated, and why they do not differ. It is likely the wording of the question – this could be the case if the survey only asked about 4-year completion and the figure is applied to both, but it is a bit of an issue because it doesn't capture those who only completed 2 years. There are also a handful of countries where this is also the case from DHS and MICS data. For DHS, it is almost all countries in Africa with very low TCR (under 1%). For MICS, Sudan 2014 has identical values for TCR2 and TCR4.

Albania MICS 2005

There are a number of data issues with Albania MICS 2006 that seem to not align. Tertiary completion rates are higher than secondary completion rates. 2-year and 4-year TCRs are identical, and the attendance rate (18-22) is much lower than the TCR. Attendance (18-22) for Q5 is only 15%, but 2-year TCR for 25-29-year-old is 76% - this seems impossible unless Albanian students don't actually enter tertiary education until above age 22. My guess is that the TCRs are off – they are extremely high. Keep Albania MICS 2005 attendance, delete TCR for both 2 and 4 year.

Bangladesh 2004, 2007, 2014 DHS

Entry rates, calculated from decomposition, are very high in Bangladesh 2004 (3.9) and 2011 (1.98) – meaning above 1, which seems improbable. Tertiary attendance and completion go down substantially in the 2014 DHS from the trend starting in 2004. The national average for two-year tertiary in 2014 is 0.0518, down from 0.1466 in 2011, which seems like an improbably large decline in a span of only 3 years. However, MICS 2013 data is also substantially lower, suggesting rates is declining. I'm not sure what to do about this. The GAR on UIS is reporting increases between 2012 and 2014 (from 12% to 16%), so suggests that the value of 0.0518 is not accurate. Delete Bangladesh 2004 for HE attendance.

Belize (2006 & 2011)

Belize MICS 2006 4-year completion data is problematic – almost all 0 values, despite high 2-year completion rates. Also, secondary completion rates (3-5 years after) are almost identical to current attendance rates among 18-22-year-olds, which suggests almost 100% transition rate to HE. But, Belize 2011, 2-year TCR are extremely low - the 2-year completion rates between the two surveys cannot be reconciled. WIQ5 2-year completion rate is 33% in 2006, falls to 5% in 2011. The 2-year completion rate calculations in particular seem problematic. Attendance rates and change in attendance rates make sense. Delete Belize 2006 2-year and 4-year completion data for 2006 and 2011. Keep attendance rates (despite being very high percentage of secondary completion).

Bhutan 2010 MICS

Bhutan reports 0 for all quintiles for both 2-year and 4-year TCR, but higher rates for attendance. A national average of 0 seems improbably low. Keep attendance data; exclude TCR data.

Cyprus EU-SILC

HE attendance rates are reported as over 95% in Cyprus; these are higher than SCRs for equivalent age group. 2 and 4-year TCRs are much lower.

Egypt DHS 2014

Egypt DHS 2014 has the 4-year TCR for WIQ4-5 going down dramatically from 2008. In general, 4-year completion rate looks very low. Delete 4-year completion from Egypt MICS.

Gabon DHS 2012

All 4-year TCR is 0 for all quintiles, which does not align with the 2-year TCR data. Note that 2-year TCRs are higher than SCR.

Italy EU-SILC 2005/2011

Italy's values for HE attendance are 85%, significantly higher than SCR for a similar age cohort.

Lao PDR MICS 2006

MICS 2006 data shows that attendance rates are 0 for all quintiles. It also shows the 2-year and 4-year TCR is 0 for WIQ5, which is lower than WIQ1. In addition, all other WIQs in Lao MICS 2006, values for 2- and 4-year TCR are identical, but this changes for WIQ5. The 2006 data is clearly off, and I can't calculate an indicator of inequality with 0 as WIQ5. Delete all data for Lao MICS 2006.

Mongolia 2005, 2013 MICS

Our data suggests that between 2005-2010, Mongolia fundamentally changed. In Mongolia 2005 MICS data, the 4-year TCR is 1%, by 2010, the 4-year TCR is 35%. This could be due to adding a year to a degree program (from 3-years to 4-years?). However, SCR and TCR values also seem extremely high – 97% of WIQ5 has 2-year TCR. Also, 2-Year TCR for WIQ2-WIQ5 are higher than the upper secondary completion rate. Exclude 4-year TCR in 2005.

Myanmar 2016

I find numerous aspects of Myanmar 2016 data concerning. First, the data on 2-year tertiary completion rate from Myanmar is very low – less than 1% across all 5 WIQs. Meanwhile, attendance rates for the 18-22-year-old cohort are as high as 33% for WIQ5, so suggest a rapid dramatic shift. That said, there seems to be no reason to not believe these data are accurate.

Nepal DHS 2006, 2011

Attendance HE rates are substantially higher (double) than secondary completion rates in 2006 for WIQ4-5.All values for 2yr and 4yr TCR are 0, after having non-zero values in 2006. Attendance rates seem plausible. Unfortunately, missing secondary completion rate data for MICS. 4-year completion rates are much lower than 2-year completion rates, but I am not going to address that. Exclude HE attendance in DHS 2006 and 2 and 4-year TCR for DHS 2011.

Nigeria MICS 2007 & DHS 2008

MICS 2007 data reports 4-year TCR for all quintiles as 0, which is not consistent with DHS data from 2008, which reports specific values, as high as 20% for WIQ5. Key issue is with the 2- and 4-year TCRs, where 4-year TCR is reported as 0, and 2-year TCR is reported as significantly lower than DHS 2008 data. Attendance rates between the two surveys are very consistent. Exclude 2007 MICS from 4-year TCR calculations; keep for 2-year.

Serbia 2013 & 2014

Serbia has two different household surveys in 2014 – MICS and EU-SILC. However, the values are quite different. One concern is that EU-SILC data for 2-year and 4-year completion data is identical in EU-SILC, which is implausible. Attendance HE rates for EU-SILC 2014 are also very high, do not align to MICS data. Check EU-SILC 2014 data.

Viet Nam 2006 & 2010

Data on TCRs and attendance rates for Viet Nam 2006 and 2010 are all 0, which are implausible given the high rates observed in the 2014 data. The 2014 data look much more plausible, and make the 2010 figures look even less plausible. Exclude 2006 and 2010 data; keep 2014 data.

Appendix B: Changes Made to Data on Private Higher Education

Multiple Year Changes

Botswana: Private share is replaced as 6.7% in 2000 and 16.4% in 2005, in line with PROPHE estimates.

The Gambia: Private share is replaced as missing for all years due to lack of consistency in data.

Luxembourg: Private share is replaced as missing for all years due to lack of definition.

Namibia: Private share is replaced as missing for all years due to lack of definition and conflicts between UIS, PROPHE and scholarly literature on the topic.

Netherlands: Private share is replaced as missing for all years due to lack of definition.

United Kingdom: Private share is replaced as 0 before 2011; replaced as missing after 2011.

2010 Updates to UIS Data

If UIS data was missing in the year 2010, we filled in the private share with PROPHE data. Data in 78 countries were updated for the descriptive analyses (Section 5 of this report). These values were used in the interpolation and extrapolation, and their inclusion added 9-10 countries to the regression analyses. The following countries and private share data points were updated:

Country	PROPHE % Private
Afghanistan	16.5
Algeria	0
Andorra	0
Angola	36.9
Armenia	19.1
Australia	7.5
Bahrain	48.9
Bangladesh	44.1
Barbados	0
Belgium	56.5
Bhutan	0
Bolivia	18.8
British Virgin Islands	0
Cambodia	59.3
Canada	11.7
Cayman Islands	0
Central African Republic	14.2
China	19.6
Comoros	23.3
Congo, Dem. Rep.	15

Congo, Rep.	32.7
Costa Rica	51
Cuba	0
Djibouti	0
Dominican Republic	53.3
Ecuador	35.3
Eritrea	0
Eswatini	0
Ethiopia	16.7
Gabon	46.3
Gambia, The	81.1
Germany	12.5
Ghana	11.3
Greece	0
Guyana	0
India	58.3
Iraq	39.5
Jamaica	96
Jordan	35.9
Kenya	13.2
Kosovo	41.2
Lesotho	13.7
Libya	19.5
Mali	11.9
Malta	0
Marshall Islands	22.4
Mauritania	0
Myanmar	0
Namibia	94.5
Netherlands	13.4
New Zealand	11.9
Nicaragua	22.6
Pakistan	14.5
Palau	0
Peru	60.5
Russian Federation	14.7

Samoa	0
Sao Tome and Principe	31.9
Sierra Leone	0
South Africa	9.3
Sri Lanka	0
Syrian Arab Republic	6
Tajikistan	0
Timor-Leste	42.9
Tonga	67
Trinidad and Tobago	10
Turkmenistan	0
Uganda	54.6
United Arab Emirates	61.5
Uruguay	13.8
Uzbekistan	0
Venezuela, RB	29.7
Vietnam	13.6
Yemen, Rep.	22.3
Anguilla	81.5
Cook Islands	59.7
Montserrat	100
Netherlands Antilles	90.5