THE PENNSYLVANIA STATE UNIVERSITY SCHREYER HONORS COLLEGE

DEPARTMENT OF POLITICAL SCIENCE

The Impact of Education on Economic Inequality in East Asia

AVA DELARGY SPRING 2022

A thesis submitted in partial fulfillment of the requirements for a baccalaureate degree in International Politics with honors in Political Science

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ABSTRACT

In this paper I propose to analyze the varying impact of education level on economic inequality with level of authoritarianism as a causal factor in East Asian countries. Often it is assumed that as average education level within a country increases, the disparity between the top income brackets and bottom income brackets will diminish because as the bottom brackets become more educated, their wages increase. Though this assumption can be supported by various past research, countries like China, Singapore, and South Korea present puzzling evidence of high education or increasing education levels, but increasing or stagnant economic inequality, when decreasing economic inequality would be expected. I propose that although regime type cannot indicate level of economic inequality, it can impact the effect that education has on economic development. I test this argument by analyzing changes in economic inequality within varying regime types during periods of increasing, decreasing, and stagnant average education levels while accounting for outside influences on economic inequality such as trade volume and government spending. This study finds that although economic inequality decreases as education level increases in a democratic state, authoritarian states see the same effect of education on economic inequality which is not expected by the original hypothesis regarding authoritarian regimes.

TABLE OF CONTENTS

LIST OF FIGURES	iii
LIST OF TABLES	iv
ACKNOWLEDGEMENTS	v
Chapter 1 Introduction	1
Chapter 2 Literature Review	3
Kuznets' Curve Model Regime Type Economic Inequality and Authoritarianism Necessity of this Study	3 5 7 8
Chapter 3 Theory	9
Conceptualizations 1. Education 2. Regime Type 3. Economic Inequality Theoretical Reasoning Effects on Economic Inequality Expectations Hypotheses	9 9 10 11 12 14 14 15
Chapter 4 Research Design	16
Case Selection and Time Period Data Collection Reliability and Validity of Measures Dependent Variable – Economic Inequality Independent Variable – Level of Authoritarianism Independent Variable – Education Level Control Variables Univariate Analysis Multivariate Analysis	16 17 18 19 19 22 23 25 26
Chapter 5 Results	28
Chapter 6 Conclusion	35
Appendix A Descriptive Statistics	36
Dependent Variable – Economic Inequality	36

Independent Variable - Level of Authoritarianism	. 36
Independent Variable – Education Level	. 36

LIST OF FIGURES

Figure 1. Linear Regression Model 1	28
Figure 2. Multiple Linear Regression Model 2	. 30
Figure 3. Multiple Linear Regression Model 3	32
Figure 4. Multiple Linear Regression Model 4	33
Figure 5. Variance in Dependent Variable-Economic Inequality	36
Figure 6. Variance in Independent Variable-Level of Authoritarianism	36
Figure 7. Variance in Independent Variable-Education Level	. 36

ACKNOWLEDGEMENTS

I'd like to thank everyone who has supported me in this research process for the past couple of years. Thank you to Dr. Casper for the advice during the planning process of this thesis as well as serving as a second reader as my honors advisor. I would also like to thank Dr. Mukherjee for his continued support over the last two years, not only providing extensive feedback on my drafts but also supporting me in my post-undergraduate studies. Additionally, I would like to thank Dr. Hojnacki for all the advice she's given during the thesis writing process, as well as my peers for their support throughout the past year.

Chapter 1

Introduction

Looking at an economic giant such as China, in the past decade, their economy has gone through a massive transition of economic liberalization under a highly conservative and authoritarian regime. Their degree of trade openness has increased, their exporting output has grown exponentially, interest rates have decreased, and infrastructure spending has increased as well. And yet, economic inequality in China has rarely seen the levels it sees now. In looking for an answer for this discrepancy, proxies for development most often hold the answers. But, when looking at education level, a common indicator for economic development, China presents a perplexing case. Education levels across the country have continued to be at an all-time high with more citizens than ever enrolling and completing education at a post-college level. When compared with a country like Japan, the a possible causal factor for this discrepancy reveals itself. Japan sees parallels in their economy's trade openness (with the exception of exports), and in their population's education attainment to China. But Japan's consistent economic inequality level is significantly lower than China's lowest period of economic inequality. The one major sector where China and Japan have never been parallel lies in their regime type which presents a potential answer to this puzzling case between states: can level of authoritarianism prevent education level from positively affecting economic inequality, or can regime type on its own be enough of an influence to increase or decrease economic inequality?

Education level itself can have a vast impact on many facets of society. In much of the research done on higher education and economic conditions within a country, a high level of education leads to higher income, and typically this high level of education is found in regimes with lower levels of authoritarianism. This would therefore point to the conclusion that lower economic inequality would be more likely in democratic states with high levels of education. But as researchers such as Mary Gallagher and Jonathan Hanson have found, regime type, on its own, cannot definitively determine what level of economic inequality a country will have (Gallagher and Hanson 2009). Though findings as these prevent causal statements between regime type and economic inequality, they invite an exploration of how level of authoritarianism might affect education level's impact on economic inequality.

East Asian countries specifically, offer strong cases for the study of economic inequality, authoritarianism, and education because of the variance each country sees in these sectors. Countries in this region have varying government structures, levels of authoritarianism, changing economic inequality over time, and high and low levels of average education attainment. By understanding how education level impacts economic inequality under different regime types, different outcomes from the same average levels of education could be better understood. As mentioned previously, China and Japan have similar average education levels, but China sees increasing economic inequality while Japan sees decreasing economic inequality. Where these cases differ is in their government types which leads to the motivation behinds this study, analyzing whether regime types play a role in education impact and how that translates to the level of economic inequality within a country. Regimes that have more authoritarian governments, tend to exercise more control within their countries which lead to more restrictive education systems, leading to less of an impact of higher educational attainment.

To investigate how different degrees of authoritarianism affect the link between education and inequality, I focus on 12 East Asian countries: China, India, South Korea, Japan, Vietnam, Cambodia, Indonesia, The Philippines, Laos, Thailand, Malaysia, and Singapore. I use data from several datasets to operationalize three variables: economic inequality, level of authoritarianism and education level, along with added control variables for economic inequality. Each country is looked at over a 30-year time period which sees changing economic conditions, regime transitions, and increasing average education levels.

Chapter 2

Literature Review

Many of the existing studies done on economic inequality address only the specific relationship between this inequality and education level but they do not account for variations in the impact of education level. There is yet to be a study that analyzes authoritarianism as a causal factor for variations in the impact of education level and system restrictiveness on economic inequality. This chapter will first explore conclusions made about the relationship between education and economic inequality, as well as research conducted with education as a proxy for economic development, and then it will move on to explore the existing research on the relationship between regime type and education and conclude with a section on regime type and economic inequality.

Kuznets' Curve Model

First looking at the relationship between education and economic inequality, the Kuznets' curve model states that a higher level of education improves income distribution across a population. As the education level of a population increases, it can then be theorized that economic inequality decreases as income becomes more uniform on an individual or household basis. One distinction made with this model is that in the short run, income inequality will increase directly as education level increases (Park 2017, 16; Ahluwalia 1976, 309; Checchi 1999, 2). It is only in the long run after economic inequality reaches its peak as education level continues to rise that income inequality will start to level in an inverse relationship with education level (Park 2017, 4; Checchi 1999, 3). Therefore, in the long run, as education level across a population increases, income inequality is expected to decrease as per the Kuznets' curve

model. In research that utilizes this model, education is more often used as a measure of economic development rather than as a direct independent variable (Park 2017, 2; Barro 1999, 26). Within this specific vein of research, education is used as a proxy for economic development rather than analyzing the direct relationship between average education level of a population and economic development. Although it is used as a proxy, the conclusions from this research are still extremely valuable because there is a large gap in the current literature that zeroes in on just these two variables specifically.

The extent to which all, or only some of the population, is well educated, also influences the distribution of income. It too has been used as a measure of country's economic development (Park 2017, 10). The greater dispersion of education within a labor force will in turn lead to an equalizing effect on income distribution. If a labor population is spread to the extent where two main groups occupy opposite ends of an education level spectrum, income would likely be distributed in a similar fashion among that labor force (Abdullah et al 2015, 18; Checchi 1999, 6). If a labor force is equally distributed along an education level spectrum, income can be expected to follow the same distribution, which would additionally signal a decrease in economic inequality between the population with the lowest and highest education level attainments (Ahluwalia 1976, 322; Checchi 1999, 7).

The question then begs why education level can have such an effect on income distribution as well as economic inequality, as a factor of economic development within the Kuznets' curve model. Several causal factors within education systems such as large-scale assessments that would restrict access for parts of the population to higher levels of schooling have been identified. In an education system that relies on restrictive factors such as large-scale assessments, a higher education level attained within this system will not necessarily increase social mobility (Marginson 2018, 6). This occurs as there are fewer citizens within the population that have access to resources for large-scale assessments, so as they achieve a higher level of education, social mobility is only increased on the individual level which does not influence economic inequality overall.

Without restrictive factors like large-scale assessments, it becomes easier within an education system for those in lower income or social classes to achieve a higher level of education. Additionally, as social mobility increases for a lower income bracket, economic inequality has been shown to decrease. Specifically regarding the restrictiveness of large-scale assessments, as they are implemented within an education system, economic inequality would be expected to increase (Zhao 2016, 12). This occurs as students who are already disadvantaged have less access to resources that would allow for greater success on large-scale assessments. With less success on these assessments, the access to higher education is restricted and these students are likely to stay within their income group after finishing primary or secondary education. As more advantaged students find more success on large-scale assessments, they are more easily transmitted into higher education institutions in comparison to the less advantaged students which further perpetuates economic inequality (Emler et al. 2019, 291).

Regarding analysis of specific levels of education, as educational attainment at the primary level of education increases, income inequality is not found to be impacted. But as the tertiary level of education is attained, there is a direct relationship with income inequality, in that it will decrease as a higher percent of the population attains tertiary education. Extensive research conducted by Barro and Lee yielded results that were consistent with economic inequality decreasing as education level increased. (Barro and Lee 2013, 193). Although there is consensus that as educational attainment increases, income inequality decreases, there is less agreement when East Asia becomes the niche focus, as well as when analyzing the relationship between education and authoritarianism (Birdsall 1955, 480; Gift 2015, 44).

Regime Type

Regarding education level under authoritarianism, in general, a more restrictive and controlling regime type will exercise its power within its education systems, often implementing policy that restricts access to higher education for citizens of a lower socioeconomic status. In the same vein of logic, an

authoritarian regime would be more likely to exercise its control within education systems than would a democratic regime because these regimes tend to have a higher degree of centralization (Li 2021, 119; Cogan and Murray 2002, 330). This often results in higher primary schooling enrollment rates within democracies as compared with authoritarian countries, and additionally, higher levels of education more equally dispersed across a population would be observed in a democracy rather than an authoritarian regime. The average level of education within a country that is democratic would also be expectedly higher than in a country with an authoritarian regime (Li 2021, 128). Often China serves as a strong counterexample with a rigorous education system and a high average level of education under an authoritarian regime. But, within this counterexample, it can be observed that this high level of education is often occupied within the wealthier sect of the population, and that the high level of education is not evenly dispersed between their urban and rural populations where educational attainment rates are also widely dispersed (Rao 2016). This would present the question of whether China's regime type is a causal factor in their increasing economic inequality, despite a high average level of education for their population. Something to note about this specific example though, is the connection between China's single ruling party and their education system. The high level of state autonomy that China has allows for the regime to exercise an extreme level of control within the education system to cultivate highly educated citizens with a high degree of regime loyalty (Ding 2006; Sorenson 1993)

A major causal factor of this phenomenon is the ability of politicians within a democracy to be influenced by the demands of society. Within an autocracy, leaders or political figures are not typically influenced by the demands of society, at least to the same extent that democratic political figures are, because autocratic leaders have not been put in their positions of power by the citizens of that society (Brown 1999, 694-696; Sorenson 1993, 15). Autocratic leaders are theoretically answering to no one and can therefore either implement restrictions within an education system or allocate less resources to education systems by reallocation of those funds to other sectors such as military power. Democratic

political leaders are at the mercy of the citizens who put them in their positions and are more willing to listen to these demands to support their re-election or to even keep their position of power in present day.

Economic Inequality and Authoritarianism

With population's level of education controlled for, the level of authoritarianism does not have a statistically significant relationship with economic inequality (Gallagher and Hanson 2009, 670). That is to say that on its own, regime type cannot be cited as a predictor of whether economic inequality will be higher or lower within a country, or whether a transition to a different regime type would be likely to increase or decrease economic inequality (King 1981, 500). That is not to state that democracies do not predict a higher level of economic development. This relationship is positive; as a regime democratizes, economic development can be expected to increase (Frantz 1999, 119). But, democracies have not been found to significantly lower economic inequality as compared to dictatorships (Boix 2003, 3; Dollar 2007, 11; Inkeles and Sirowy 1990, 127-129).

Looking to more specific regime types, a regime with a single ruling party would have lower levels of economic inequality than those without a ruling party, and additionally, regimes with multiple political parties will have lower levels of economic inequality than those who restrict the number of active political parties, as found in a 2009 study by Hanson and Gallagher (Gallagher and Hanson 2009, 668). While it can be stated that an authoritarian leader's specific policies may lead to a higher or lower level of economic inequality, the actual regime type on its own is not a concrete indication of where a country's economic inequality level would fall. This conclusion has been found on the basis that economic inequality levels within an authoritarian regime typically depend on the "sticks" implemented by autocratic rulers that allow them to stay in power (King 1981, 501). That is, the policies or amount of control exercised by an authoritarian leader that are the indicators of where the level of economic inequality or income distribution would fall. These policies implemented by authoritarian leaders are influenced most presently by the presence of threat within their environment which could include but is not limited to the threat of a domestic uprising, or international exterior threats.

Though it is widely recognized that regime type cannot be a complete and accurate predictor of economic inequality, or how it will change, specific facets of regime type such as political stability can be said to be indicators of what income distribution across a population will look like. In a regime that is said to be more politically stable such as a democratic state, economic inequality is likely to be lower, or to decrease across time as stability progresses (Muller 1985, 50). Conversely, in an authoritarian state that is attempting to become more politically stable in terms of democratization, if economic inequality already exists at a high level, this inequality will hinder democratization, and additionally inequality is likely to be constant at a high level with the regime continuing to exist in its authoritarian form. Alternatively, within newer democracies, economic inequality can tend to increase as leaders fulfill their own interests with their political rights in the early stages of this transition (Simpson 1990, 690). But, as the democratic state continues to build after transition from a more authoritarian regime, economic inequality will eventually level, presenting an inverted-U curve relationship. Because of these discrepancies in conclusions, it can only be definitively stated that regime type on its own cannot be a reliable predictor of economic inequality.

Necessity of this Study

The question then becomes, if it is not simply the education level of a country that influences economic inequality, could it be the restrictiveness of its education system that influences the inequality. While much of the research discussed previously sought to find a relationship between education and economic inequality, or education and socioeconomic status/economic development, the role of government has yet to be analyzed as a causal factor in restricting the impact of education to the extent that economic inequality is exacerbated.

Chapter 3

Theory

Conceptualizations

Existing research has only touched on the individual relationships, analyzing either the impact education level has on economic inequality or trends in economic inequality under the conditions of authoritarianism. At the intersection of education and economic inequality with regime type as an explanatory factor is where a gap in the research lies. Within this section, conceptualizations of each of the variables are presented, along with the main theoretical reasoning which provides the argument behind the posed hypotheses. The central theory follows that educational attainment will have less of an effect on economic inequality within countries that are more authoritarian.

1. Education

Looking first to the independent variables, education will be utilized in this study as education level as well as education system. Utilizing these two dimensions of a single concept allows for an additional independent variable to be added which will be education system. Education level refers to the amount of education level attained as well as the skills attained by a population, and their ability to contribute to a society with that schooling. The average level of education of the population of each country reflects a certain level of educational attainment such as primary education (refers to K-12, or elementary, middle school, and high school levels), secondary education (refers to college/university level), or tertiary education (refers to the graduate level). As for education system, this will be defined as the restrictiveness of an education system. This refers to how difficult access to education within a country is, and the level of ease with which a person of any socioeconomic status is able to attain a higher level of education past K-12 schooling levels. For education level, public/private schooling is not distinguished between, but for restrictiveness of an education system, this variable only refers to restrictions to higher education institutions within the public schooling sector and how access to acquiring education or the skills attained through education is restricted.

2. Regime Type

The second concept to be defined, regime type, is straightforward as well. A frequently referenced definition for the term regime on its own is guided by a set of rules that distinguishes democracies from autocracies. These rules reference decisions that a leader or leadership group of a regime would make and how those decisions influence policy and reflect the interests of the leadership group and unrepresented groups (Geddes et al. 2014). Within an autocratic regime, for example, the leadership party would typically represent the dominant ruling party, military, or dominant ethnic group, and would make decisions based on those interests which influence domestic and international policies, rather than making decisions based on the country or territory. Within this work though, regime type will be referenced as the level of authoritarianism within a government which can be determined by multiple characteristics within that regime. Level of authoritarianism can be thought of in general terms as the amount of control a government holds or exercises over the group that it governs. Authoritarianism can also be conceptualized by considering factors such as the rights and freedoms of citizens within a territory or to what extent those rights and freedoms are protected (Czap and Nur-tegin 2012, 52-53). Other indicators of authoritarianism that help to categorize a regime are competition within elections, political participation, constraints on the chief executive, and regulation of elections/political participation. An authoritarian regime will be defined as a regime that allows for very few freedoms and civil liberties for

their citizens and very little protection of the liberties they are afforded (Olson 1993, 572). This could look like lack of safeguards against corruption, lack of freedom of speech, lack of freedom of religious expression, lack of protection for NGOs, etc.

As for degree of democratization within an authoritarian government, political participation and competition will be limited, many times to an extreme within an authoritarian regime. For example, a democratic regime would have a higher political participation as well as competition within elections, contrasted with an authoritarian regime which would have little political competition as well as barriers to political participation (Marshall 2014, 28-29). Authoritarian regimes will additionally have lower protection of the right to organize in competitive political parties or a complete lack thereof or may lack elections altogether. Conversely, a regime defined as democratic or non-authoritarian may not have an elected president but may have elected legislative representatives, multiple political parties, and protections against corruption within the political system.

3. Economic Inequality

As for economic inequality, this variable is somewhat straightforward. This conceptualization can be broken into two facets of inequality, wealth inequality as well as income inequality. Wealth inequality is distinguished to account for inequality in wealth that a household or individual may have amassed independent of their income (Shin 2020). This can be contrasted with income inequality which refers to the disparity in income between the top 10% and the bottom 10% or bottom 20%. Both wealth inequality and income inequality can be used independent or combined to get an accurate understanding of where the level of economic inequality lies within a country or region.

Theoretical Reasoning

As many might assume, a higher average education level across a population would likely lead to a decrease in economic inequality. As lower socioeconomic classes are able to achieve higher average levels of education, economic inequality would be expected to decrease even with citizens from these classes having more opportunities through education for high paying jobs. East Asia paints a different picture with anomalies such as China. China's average level of education continues to increase each year as their rigorous education system pushes children in K-12 schooling into institutions for higher education. And yet, their wealth gap continues to rapidly expand. This can be contrasted with Japan which has a similar high average level of education, but conversely sees decreasing economic inequality. There are many reasons that regime type should be cited as a causal factor for this observed diversion in impact of education on economic inequality. Though regime type can adversely affect spending in the private sector education, such as specialty schools, boarding schools, religious schools, etc., this theoretical reasoning will rely specifically on the relationship between democracy and increasing spending on public education rather than private education.

Looking at this specific relationship, the priority of education investment is dependent on the regime type. Within a democracy, political leaders, whether that is the leader at the national, state, or even county level are constantly held accountable with elections. They are expected to prioritize education spending and are held accountable for the quality of education under their jurisdiction. Autocracies do not see the same kind of accountability for their leaders. If education standards are not met as demanded by constituents, an authoritarian leader does not have the pressure of an election to meet these demands as they may have an indefinite ruling period and cannot be removed from office as efficiently as a leader in a democracy or more democratic regime type.

Additionally, democracies have incentive to increase spending within the education system because it is in their favor to bolster their middle classes. As access to education becomes less restrictive and the average level of education is increased across a population, more citizens are able to move from the lower-class or below the poverty line into the middle-class, socioeconomically. Having a strong middle-class grows the economy for a country and allows for better governance because it lessens the power of the 1% who can skew democracies through expensive lobbying and excessive campaign funding (Birdsall 2010, 172-175). This is in stark comparison to autocracies where it is in their interest to weaken the middle class. A strong middle class increases the likelihood up uprising within an autocracy and additionally strengthens the power that the uprising or revolt could hold over a leader or regime.

An autocracy has less incentive to fund education because as their population's average educational attainment rises, citizens may, as mentioned, mobilize to start a transition to democracy, or they may migrate to another country taking with them innovative education and economic resources. To continue holding office, a politician within a more democratic regime will likely want to increase government responsiveness and as responsiveness increases, the chances of them being voted out of office decrease (Brown 2002, 118). As previously mentioned, politicians within a democratic regime are likely to come under pressure to bolster the education systems under their authority and because these politicians are in a position in which they want to increase government responsiveness to continue holding office, education system allocations are more likely to increase if that is what is demanded of the politicians. This is simply a phenomenon that is unlikely to occur under an autocracy because of the lack of pressure those autocratic leaders would experience in office. It is important to note though, that democracy does not always guarantee this kind of mobilization of pressure on politicians or increase in government responsiveness.

As an additional thought on education spending and regime type is that in almost any given regime, a large part of a population is likely to be enrolled in school whether that be at the primary, secondary, or tertiary level (Brown 2002, 120). Although citizens at the primary level of schooling likely cannot vote until their last or second-to-last year of primary schooling, they likely have parents who care about the amount of spending allocated to their dependent's education and these parents have the power to vote within a democracy. Similarly, those enrolled in secondary and tertiary levels of schooling have

the power to vote. As mentioned, politicians within a democracy want to appeal to the largest portion of the population as possible to continue holding office, and because a large portion of a population is enrolled or directly involved in the education system, politicians under democratic regimes are more likely to prioritize education spending on their agendas to increase appeal. Again, this is something that would not be as likely under an autocratic regime because leaders are not as concerned with being voted out of a position.

Effects on Economic Inequality

We see this disparity between democracies and autocracies reflected in the impact on economic inequality. Previous research demonstrates that an authoritarian regime will likely see higher levels of economic inequality because they have little incentive to bolster their middle classes and implement policies as an autocratic ruler that may exacerbate preexisting economic inequality (Boix 2003, 3-4).

Expectations

I hypothesize that the variation in impact of education level on economic inequality can be accounted for by analyzing the level of authoritarianism in a regime. I expect to see a negative relationship between education level and economic inequality under a democratically categorized regime, that being that as education level rises, economic inequality will decrease in a democratic state. Alternatively, I expect to see the level of economic inequality stagnant or increase as average education level increases in authoritarian states. Specifically looking at restrictiveness of education systems, I expect that under a democratic regime, even with a restrictive education system, economic inequality will either remain stagnant or decrease, and under an authoritarian regime, I expect that with a highly restrictive education system, economic inequality will increase.

Hypotheses

H1: As education level increases, economic inequality will decrease.

H1.1: As education level increases under a democratic regime, economic inequality will decrease.

H1.2: As education level increases under an authoritarian regime, the level of economic

inequality will either remain stagnant or increase.

H2: As level of authoritarianism in a regime increase, economic inequality will increase.

Chapter 4

Research Design

The research method that will be used for this study is a quantitative research design. This is the most reasonable research design to implement as each of the variables can be measured using objective data which is more reliable for this study than using a qualitative research method. The dependent variable, economic inequality is operationalized using a measure of income inequality and a measure of wealth inequality. The first independent variable, level of authoritarianism is measured by a democracy score, autocracy score, and sum of these two scores: the Polity score, a civil rights and political liberties indicator to give a degree of freedom, and degree of democratization. The second independent variable, education level is measured quantitatively using school enrollment statistics and literacy rates across a population. Descriptive statistics for each of these variables can be found in <u>Appendix A</u>.

Case Selection and Time Period

12 countries in Eastern Asia will be analyzed across a 30-year period. Each of the 12 cases are countries primarily in the East Asian region. The cases that will be analyzed are China, India, South Korea, Japan, Vietnam, Cambodia, Indonesia, the Philippines, Laos, Thailand, Malaysia, and Singapore. The unit of analysis that will be studied is country and year. I decided to use country to compare the different levels of authoritarianism within East Asian regimes as well as the economic inequality and education levels. Year was chosen as a unit of analysis to analyze how regimes change over time and how this affects the impact of increasing or decreasing education level on economic inequality.

The 12 cases that were chosen were selected based on their geographic location primarily on the Eastern half of the Asian continent, and the variance they added to the independent variables, regime type and education level. For the regime type variable, the selected cases needed to provide a wide range of varying degrees of authoritarianism within the government. The cases selected provide a scale of

authoritarianism ranging from relatively free states with democratic and electoral governments, such as Japan and South Korea, to states that are not free, such as China and Vietnam, with communist governments. The countries selected additionally provided a sample of regimes that had transitioned from being labeled as an autocratic state by one of the regime type measures used, to a democratic state by the same measure. For example, within the time period selected, South Korea undergoes a regime transition in 1987, starting with a Polity score of negative five in 1986, which implies an autocratic state, and transitioning to a democratic state in 1988, ending with a Polity score of six (Gurr and Marshall 2020. Polity5 Dataset). Alternatively, countries such as Japan are consistently classified as a democratic state across the entire time period. The time period chosen, 1980-2010, was selected because it allows for these regime transitions to be observed and provided a wide range of changing education levels.

Data Collection

Data collection was done using several separate sources of data. For the dependent variable, economic inequality, two measures were used to account for income inequality and wealth inequality: the Gini Index for income inequality and a ratio between the top 20 percent's share of income and the bottom 20 percent's share for wealth inequality. Both these measures were sourced from the World Income Inequality Database (UNU-WIDER 2021. World Income Inequality Database). The first independent variable, level of authoritarianism, is quantified using three measures of regime type, with data sourced from Freedom House's Freedom in the World Dataset, The Center for Systemic Peace's Polity5 dataset, and Tatu Vanhanen's Polyarchy Index of Democracy V2 dataset (Freedom House 2021. Freedom In the World Dataset; Gurr and Marshall 2020. Polity5 Dataset; Vanhanen 2000. Polyarchy version 2). The second independent variable, education level, is measured by school enrollment rates and population literacy rates which were sourced using the Barro and Lee Educational Attainment Dataset. Because the data collection sourced observations from multiple datasets, a weakness within this research design is inconsistency with measures. A consistent collection practice for data is ensured within the economic inequality variables and the education level variables, because both these concepts are using variables from the same datasets. But, when it comes to regime type, three separate measures of government and authoritarianism are being utilized which implies that different data collection practices may have been applied to different datasets. Overall, another weak point within this design is that some of the data may not be as reliable because of the selected countries that are being analyzed. For example, economic inequality and education level data within states such as China will not be as reliable as other states because of a higher level of control as well as secrecy within their governments. Other states will have compromised regime type data as well because ongoing conflict within the 30-year period has made data collection difficult or impossible. Additionally, for regimes that went through periods of transition, this poses a challenge for data collection because it is more difficult to accurately reflect how to correctly categorize that government in a specific year. Therefore, regimes that are highly autocratic, saw periods of conflict, and underwent regime transitions will have less reliable data observations than states that did not present these challenges.

Reliability and Validity of Measures

Within this next section, the reliability and validity of each measure selected will be discussed. Reliability is discussed in terms of comparison, using additional common measures of economic inequality, regime type, and education level to compare to the data found in the selected measures. Validity is discussed in terms of whether the dataset selected is measuring what it actually seeks to measure.

Dependent Variable – Economic Inequality

This variable was measured by income inequality, using the Gini Index, and wealth inequality, using a measure of ratio between the bottom 20 percent and the top 20 percent. Both measures came from the variables from the May 2021 World Income Inequality Dataset on income inequality statistics (UNU-WIDER 2021. World Income Inequality Database). Data from the World Income Inequality Dataset can be compared against data from the SWIID to analyze reliability (Solt 2019. SWIID v.8-9). Between 1980 and 1990 in China, WIID data show an increasing Gini coefficient which would indicate increasing income inequality across the population (UNU-WIDER 2021. World Income Inequality Database). When looking at China within the same time period in the SWIID dataset, China is shown to have an increasing Gini coefficient which is consistent with the WIID data, therefore making this measure more reliable because of consistency in the results. As for validity, the WIID was created with the aim of measuring income inequality and does so by including specific variables such as the ratio between the top 20 percent and the bottom 20 percent which compares income brackets. The dataset also includes the Gini coefficient values, which are the most widely used indicators of income inequality, and additional measures such as the Palma ratio which is the top ten percent of the population's share of income divided by the bottom 40 percent's share of the population's income.

Independent Variable - Level of Authoritarianism

Regime type is quantified by three different measures. The first measure is the Polity score of a country which combines a score of democracy and a score of autocracy which come from the Polity5 dataset. The second measure is a country's degree of a democratization which measures competition and participation within a regime which is sourced from the Polyarchy version 2 dataset. The last measure is freedom within the regime which combines a political rights score, and civil liberties score to produce a categorization of *Not Free*, *Partly Free*, or *Free*, which is sourced from Freedom House.

Polity5 Dataset

The data within the Polity5 dataset, which is currently being updated, and are originally from the Polity IV dataset can be considered reliable. Taking into consideration that the Polyarchy dataset will also be used in this study, data from the Polity5 dataset can be compared with an additional regime type dataset to test consistency of results. Looking at India between the years of 1974-1990, the Polity score decreases to six and then increases to eight, reflecting a transition in regime and an increase in democratic qualities (Gurr and Marshall 2020. Polity5 Dataset). Now looking at Gasiorowski's Political Regime Change Dataset, India is coded as authoritarian in 1975, transitional in 1977, and democratic two months later in 1977 (Gasiorowski 1996. Political Regime Change Dataset). This reflects reliability in both dataset results, but not interchangeability or validity. Though reliable, the Polity5 dataset does not hold the same standard of validity. This dataset aims to measure how democratic a regime is, but better measures change and transition in regimes rather than actual level of democracy. However, the Polity5 dataset does include a durability variable which measures how likely it is that a government is consistent in its regime type which can better measure how democratic a regime is at a certain point in time. This durability variable adds to the validity of this dataset, but again, Polity5 cannot be considered as valid as it is reliable. Therefore, Polyarchy data and Freedom House data will also be used in the measure of authoritarianism.

Polyarchy Dataset

To measure the reliability of the Polyarchy dataset, the results can be compared with the observations within the Polity5 dataset and the Freedom in the World dataset for consistency. The author of this dataset, Tatu Vanhanen, admits that his measure is the simplest out of most measures of democracy because it only focuses on two indicators of a democratic regime (competition and participation), therefore it may be difficult to compare the results because other measures consider far

more variables (Vanhanen 2000, 252). Despite this fact, the political competition variable within the Polyarchy dataset is highly correlated with Freedom House's variable of political rights and civil liberties. While this does not assume that Freedom House and the Polyarchy's index for democratization should be used interchangeably to measure democracy, it shows that Vanhanen's measure of democracy is reliable when compared to Freedom House because the results are correlated and consistent. The observations within the Polyarchy dataset are also highly correlated with the results from the Polity democracy scale and its DEMOC-AUTOC variable which measures how democratic and autocratic a country is (Vanhanen 2000, 258). This would suggest that this measure is reliable because although it is using different indicators, it is yielding very similar results to two of the most widely used measures of democracy.

The intention in creating the Polyarchy dataset was to employ two, simple variables that could measure the differences between political systems. Looking again at the country of South Korea, in 1987 when they had their first direct presidential election, 55.4% of the total population participated in the election. The Polyarchy project states a threshold value of 10% population participation to denote a country as democratic for the variable electoral participation (Vanhanen 2000, 259. When South Korea transitioned to a democracy in 1987, it was coded as a democracy within the Polyarchy dataset, therefore Polyarchy's index of democratization is a valid measure as it acurrately categorized South Korea as a democracy after its regime transition.

Freedom in the World Dataset

The last measure used to quantify level of authoritarianism was the Freedom in the World Dataset from Freedom House (Freedom House 2021. Freedom In the World Dataset). This dataset's reliability can be analyzed by comparing its results with Gasiorowski's Political Regime Change Dataset, similar to the Polity5 comparison made previously in this section. Looking again at India between the years of 1974-1990, in 1977 Freedom House would code India as "F+", which denoted that the country had transitioned from "Not Free" or "Partly Free" status, to "Free" prior to 1977 ("+" denotes a status change from the previous year) (Freedom House 1977. Freedom in the World Dataset 1977). In 1978, India is coded as "F" by Freedom House which would indicate that in 1978, and the year prior, the country was also categorized as "Free" (Freedom House 1978. Freedom in the World Dataset 1978). As mentioned above, Gasiorowski would code India as authoritarian in 1975, transitional in 1977, and democratic two months later in 1977 (Gasiorowski 1996). These results are consistent with the observations reported by Freedom House which show a transition in regime type in India in 1977. Considering that the Freedom House results are consist with Gasiorowski's Political Regime Change Dataset, as well as Polity5 data, Freedom House is a reliable measure.

As far as validity, Freedom House does not measure regime type well, but rather degree of freedom in a regime. With that in mind, the measure of degree of freedom uses indicators for political freedoms and civil liberties that would be found in most democratic regimes with low levels of authoritarianism which is why this measure is still being utilized in this study. Because Freedom House asserts that it measures freedom within a country, rather than regime type, it is valid on the basis that it measures what it claims to measure. But, in terms of measuring regime type, this measure is not as valid as datasets such as the Polity5 and Polyarchy2 datasets.

Independent Variable – Education Level

This last variable was measured using primary, secondary, and tertiary enrollment rates in schools, as well as population literacy rates which were sourced from the Barro and Lee Educational Attainment dataset. The most widely used databases for education data are currently UNESCO, Eurostat, OECD, PISA scores, and the World Bank, four of which were either used as sources for collecting data for this dataset or used Barro-Lee data to compile their own datasets. This educational attainment dataset can also be considered reliable when education inequality, measured by education distribution throughout

a country, is taken into consideration. The education Gini coefficient, as derived by Barro and Lee, reflects that education inequality decreased between 1995 and 2000 (Smyth and Qian 2007, 136). Research done by Huang, Liu, and Yang on education inequality in China, measured inequality using a different formula to derive an education Gini coefficient (Tomas et al 2003). They came to the same conclusion that education inequality had decreased from a coefficient of 0.2829 in 1996, to 0.2377 in 2000 (Huang, et al. 2014, 4).

This educational attainment dataset was created to measure the distribution of education attainment among age groups and genders across countries and does just this with its current variables. Many international organizations that provide statistics on educational attainment have even referenced the Barro-Lee dataset, such as the World Bank education dataset, and cite these data as part of their sources (World Bank 2018, School Enrollment Dataset, 1960-2018). To measure distribution of education, data on the percentage of population that has a certain level of education needs to be available. Barro and Lee's dataset includes variables (*lu, lp, lpc, ls, lsc, lh, lhc*), that measure the percentage of the population that has attained each of these seven levels of education. The variable "*yr_sch*" (avg years of schooling attained), additionally provides data for comparison of average years of schooling between countries. Therefore, the educational attainment dataset is a valid measure for education level of a population.

Control Variables

Five control variables have been added to analyze the relationship between economic inequality, level of authoritarianism, and education excluding external economic forces. Each of these chosen variables are assumed to affect income inequality and could influence the impact that regime type or education level have on economic inequality. The first control variable chosen is gross domestic product (GDP). GDP values were sourced from the World Income Inequality Database and are being used to measure the

economy size for each of the selected countries (UNU-WIDER 2021. World Income Inequality Database). GDP is controlled for within this study because it provides a good indication of whether a country's economy is contracting or expanding. If an economy is expanding with GDP rising, a positive linear relationship with income inequality will be observed as shown in past research, and income inequality will increase (Barro, 2008, 7; Mo 2003, 298; Choi 2006, 813). Alternatively, if the GDP growth rate is decreasing, economic inequality has been shown to decrease (Halmos 2011, 124; Mo 2003, 299; Choi 2006, 813). The second control variable used is gross domestic product per capita. This variable is sourced from the World Bank GDP per capita growth dataset and is expressed as annual percentage growth rate of GDP per capita (World Bank 2020. GDP Per Capita Growth Dataset). GDP per capita was controlled for because there is a significant negative relationship between GDP per capita and income inequality. As GDP per capita increases, economic inequality is shown to decrease (Smith 2021, 6; Mele et al. 2016, 11). The next control variable used is trade volume. Trade volume is measured within this dataset by the trade intensity ratio which sums exports and imports which is then expressed as a percentage of the gross national product. Trade volume observations were sourced from the Penn World Table database, version 10.0 which additionally sources data from the International Comparison Program National Accounts Expenditures Data within the World Bank Database (Feenstra et al. 2015). Though the argument has been made that in the past decade, trade's influence on economic inequality has decreased, trade volume can still impact whether inequality increases or decreases, with a positive relationship being observed. As trade volume increases, income inequality is expected to increase as well (Basdas and Celik 2010, 361; Richardson 1995, 41; Cin et al. 2013, 104). Population size is also controlled for, with observations from the World Bank's Total Population dataset (World Bank 2020. Population Size Dataset). Population size has been found to have a positive relationship with income inequality, but this relationship is often found to not be statistically significant (Holasut and Sitthiyot 2016, 27; Deltas 2003, 230). Though population size is not expected to directly affect education's impact on economic inequality under different regime types because this variable does not have a significant relationship with economic

inequality, it is still controlled for because the data collected and used for analysis is at the country-level. Additionally, social security and welfare spending, as well as government expenditure are controlled for. Social security and welfare spending observations are sourced from the OECD Social Spending dataset and are expressed as the percent of the total GDP that is allocated to social welfare efforts such as cash benefits, financial benefits for the elderly, disabled, and sick, programs that redistribute resources across low-income households, or any general benefits that are controlled by the central, state, or local governments that has a social benefit purpose (OECD 2022. Social Spending (Indicator) Dataset). As social spending increases, economic inequality is expected to decrease (Jones 2007, 14). The last control variable being utilized is government spending. This is expressed as a percentage of a country's GDP as well. Data was sourced from the World Bank's general government final consumption expenditure dataset (World Bank 2020). Government spending will be used in the context of current expenditures by regimes on purchases of goods and services, financing national defense and security, and military expenditures that do not directly impact government capital formation (World Bank 2020). Government spending is found to have a negative relationship with economic inequality, that is, when spending increases, inequality decreases, and because of this statistically significant relationship, government spending is controlled for within this study (Anderson et al. 2016, 980; Mello and Tiongson 2006, 302; Madzinova 2017, 212; Firebaugh 1980, 140).

Univariate Analysis

In initial univariate analysis, a high degree of variance can be observed with each of the variables. As previously mentioned, the regime type variable varies across measures such as level of participation and competition in elections, with some of the countries having virtually no competition in elections and other countries having a level of competition regularly seen in recognized democracies. Additionally, with polity scores (autocracy score 1-10 subtracted from the democracy score 1-10), score range from -7 to positive 1, implying that there are very autocratic regimes as well as very democratic regimes. For example, China has a score of -7 for nearly the entire 30-year period, whereas Japan has a score of 10 for nearly the entire period. Looking at economic inequality as measure by one of the variables, the Gini Index, some countries such as Japan have a very stagnant level of economic inequality, whereas other countries such as China and the Philippines have a rising level of income inequality. Notable patterns that would lend to testing the hypotheses previously posed in the theory chapter lie within the education level data. Out of the 12 countries within this study, all 12 see an increase every five years within this time period in total average years of schooling across their population. Though some countries such as Cambodia and the Philippines see a smaller or slower increase as compared to cases like South Korea and Singapore, all 12 countries do see an increase in education attainment in every five-year increment.

Multivariate Analysis

To test the hypotheses, multiple linear regressions were used for multivariate analysis to observe the relationship between the dependent variable and independent variables over the specified time period. Four multiple linear regressions were run, the first with no control variables added. The second regression run had three general controls added: GDP per capita, population size, and economy size, expressed as a country's GDP. For each of these first three control variables added, the natural log (ln) was taken for each of the values in order to standardize the observations. The third regression run had control variables for social security and welfare spending and trade volume added, as well as a dummy measure for democracy which was a binary variable that coded each country as either zero and one, indicating whether that country was a democracy or not. In the fourth regression run, a last control variable was added which was government expenditure. The last three control variables are expected to have the most significant impact on the relationship between the dependent and independent variables. Within the regressions run, an interaction term was created and added using the polity dataset's polity scores to create the interaction term between a measure of autocracy and a measure of literacy as a quantifier for education level. The inverse of the polity score (inverse of the autocracy score subtracted from the democracy score), was used for this measure of autocracy. Literacy rates were then used as a measure of education level which can be calculated using enrollment rates for the percentages of populations that have completed a specific number of years in schooling that would therefore indicate competent literacy.

Chapter 5

Results

After conducting the multivariate analysis, the results find that while increasing education level does see decreasing economic inequality, level of authoritarianism in a government does not impact this relationship. Figure 1 below shows the testing of hypotheses H1 and H2 presented in the theory chapter: As education level increases, economic inequality will decrease, and as level of authoritarianism in a regime increases, economic inequality will increase. This first model does not include the control variables presented in the previous section, but includes the interaction term, autocracy times literacy (autoc_lit), and tests how education level given the level of authoritarianism within a government impacts economic inequality (ds_gini).

. xtreg ds_gi	ni autocracy 1	literacy aut	oc_lit			
Random-effect:	s GLS regress:	ion		Number	of obs =	238
Group variable	e: cowcode	Number	of groups =	67		
R-sq:				Obs per	group:	
within :	= 0.1259				min =	1
between :	= 0.0068				avg =	3.6
overall :	= 0.0865				max =	22
				Wald ch	i2(3) =	24.20
corr(u_i , X)	= 0 (assumed	d)		Prob >	chi2 =	0.000
ds_gini	Coef.	Std. Err.	Z	P> z	[95% Conf.	Interval]
autocracy	.2184918	. 1825577	1.20	0.231	1393147	. 5762984
literacy	0157894	.0461265	-0.34	0.732	1061957	.0746168
autoc_lit	0057524	.0022041	-2.61	0.009	0100724	0014325
_cons	44.49393	3.754549	11.85	0.000	37.13515	51.85271
sigma_u	9.6809907					
sigma_e	3.0712095					

Figure 1. Linear Regression Model 1

As seen in Figure 1, this first regression finds a significant negative relationship between the variables, ds gini, and the interaction term, autoc lit. The correlation between level of authoritarianism and economic inequality is shown to be positive with a coefficient of .2184918 which finds that the more authoritarian a government is, the higher economic inequality that country will see. The correlation between literacy and economic inequality is negative as expected by the hypothesis with a coefficient of -.0157894. This result shows that as education level increases, economic inequality will decrease. With these first two results, the p-value is high (.231 for the first relationship and .732 for the second result), showing that these results are not as statistically significant as the relationship that the model finds between economic inequality and the interaction term of autocracy times literacy. Looking at the last result, the correlation between economic inequality and autocracy times literacy shows a negative relationship, therefore as education level increases, economic inequality will decrease despite whether education level is increasing under an authoritarian regime or democratic regime. The p-value for this result, .009 is significantly lower than the p-values from the above stated relationships, and is also less than .05, making this result statistically significant which rejects hypothesis H1.1: As education level increases under a democratic regime, economic inequality will decrease, and H1.2: As education level increases under an authoritarian regime, the level of economic inequality will either remain stagnant or increase. This first regression result has an R^2 value of .0865 which shows that without the control variables added to the regression, the model cannot account for all variations in the dependent variable.

The second model ran includes the same dependent variable, economic inequality, the same independent variables, autocracy and literacy, and the same interaction term, autocracy times literacy, but includes control variables for GDP per capita, population size, and GDP to account for economy size. Figure 2 shows an increasing R^2 value, therefore presenting that with these control variables added, the model better fits the observations made for the dependent variable economic inequality. With the added control variables, this model sees the R^2 value increase as well as the p-values.

. xtreg ds_gin	ni autocracy l	literacy aut	oc_lit wo	di_lngdpp	c wdi_ln	pop l	ngdp
Random-effects	GLS regress:	ion		Number	of obs	=	213
Group variable	e: cowcode			Number	of group	s =	66
R-sq:				Obs per	group:		
vithin =	= 0.1334				, m	in =	1
between =	= 0.0340				а	vg =	3.2
overall =	= 0.1150				m	ax =	14
				Wald ch	i2(6)	_	22 80
corr(u i X)	= 0 (assumed	4)		Prob >	12(0)	_	23.89 0 0005
ds_gini	Coef.	Std. Err.	Z	P> z	[95%	Conf.	Interval]
autocracy	.2255204	.2193004	1.03	0.304	2043	005	.6553413
literacy	0089839	.0663017	-0.14	0.892	1389	328	.1209649
autoc_lit	0059183	.002578	-2.30	0.022	0109	711	0008655
wdi_lngdppc	1.039988	1.460312	0.71	0.476	-1.822	171	3.902148
wdi_lnpop	.2773727	1.64748	0.17	0.866	-2.951	628	3.506373
lngdp	8933815	1.173863	-0.76	0.447	-3.194	111	1.407348
_cons	53.96877	16.11672	3.35	0.001	22.38	058	85.55696
sigma_u	9.150075						
sigma_e	3.0664384						
rho	.89902979	(fraction	of variar	nce due t	o u_i)		

Figure 2. Multiple Linear Regression Model 2

As shown in Figure 2, the first correlation between economic inequality and authoritarianism shows a positive coefficient of .2255204 that has just slightly increased by .007 from the first regression run, which shows that controlling for GDP per capita, population size and economy size does not have a significant impact on this relationship. As for the relationship between economic inequality and literacy, this coefficient has also been just slightly adjusted by the addition of controls, decreasing by .0068, but still shows a negative relationship between economic inequality and education level. For both results, the p-value has increased, showing that the correlation between authoritarianism and education level with economic inequality becomes less statistically significant when the control variables are added.

As for the relationship between economic inequality and the interaction term, autocracy times literacy, this relationship stays negative and sees a slight increase in the coefficient as compared to the first model. This result's p-value increases by .013 showing that the correlation between economic inequality and education level given regime type become less statistically significant as GDP per capita, population size, and economy size are controlled for. The R^2 value for this model with controls added has increased by .0285 with the addition of new controls. As the R^2 value increases, this shows that this model can better explain the variance in economic inequality with control variables added, again as compared to the first regression run.

As for the third and fourth models below, these results have additional control variables: social security and welfare spending (gessw), trade volume (pwt openk), and government spending (ea exp), as well as an added dummy measure of democracy (dem). Figures 3 and 4 below show the results of adding these controls to the regressions. Figure 3 includes only control variables for GDP per capita, population size, economy size, social welfare spending, trade volume, and a dummy measure of democracy. Figure 4 has an additional control variable which measures government expenditure. As shown in the below figures, the coefficient representing the relationship between economic inequality and autocracy switches directions, from an increasing coefficient to a significant decrease. The coefficient decreases from .2255204 to .0555688 with the addition of control variables for welfare spending and trade volume, which therefore shows that either variables, welfare spending or trade volume, have a significant impact on the relationship between economic inequality and regime type. The coefficient then additionally decreases with government expenditure controlled for, decreasing to .0002518 in the last model, Figure 4. Important to note though, the p-value for this result is .822 which shows this is result is not statistically significant. The relationship between economic inequality and literacy sees a decrease in the coefficient with the addition of these control variables, decreasing from -.0089839 to -.0282058. The coefficient then slightly increases in the fourth model to -.0207027. The p-value for this result increases similarly to the p-value for autocracy, showing that as controls are added in both figures 3 and 4, the results continue to become

less statistically significant. As far as the relationship between the dependent variable and the interaction term, autocracy times literacy, with the addition of social security and welfare spending, and trade volume, the coefficient increases just slightly from -.0059183 to -.0048322,

. xtreg ds_gi	ni autocracy l	iteracy aut	oc_lit wo	li_lngdpp	c wdi_lnp	oop l	ngdp dem g	essw pwt_openk
Random-effects	s GLS regressi		Number	of obs	=	199		
Group variable	e: cowcode		Number	of groups	5 =	65		
R-sq:				Obs per	group:			
within =	= 0.0997				m	in =	1	
between :	= 0.0323				av	/g =	3.1	
overall =	= 0.0789				ma	ax =	12	
				Wald ch	i2(9)	=	15.63	
corr(u_i, X)	= 0 (assumed)		Prob >	chi2	=	0.0750	
	1							
ds_gini	Coef.	Std. Err.	z	P> z	[95% (Conf.	Interval]	
	and a standard of the loss	LOSE TRANSPORTA						
autocracy	.0555688	.2466568	0.23	0.822	42786	597	.5390073	
literacy	0282058	.0683267	-0.41	0.680	16212	237	.105712	
autoc_lit	0048322	.0029201	-1.65	0.098	01055	555	.000891	
wdi_lngdppc	1.426466	1.466116	0.97	0.331	-1.447	707	4.300001	
wdi_lnpop	2758498	1.723938	-0.16	0.873	-3.6547	706	3.103006	
lngdp	5410771	1.222966	-0.44	0.658	-2.9380	946	1.855892	
dem	-2.445519	1.315216	-1.86	0.063	-5.0232	294	.1322562	
qessw	4712771	.9165465	-0.51	0.607	-2.2676	575	1.325121	
pwt openk	0159046	.0206268	-0.77	0.441	05633	324	.0245231	
cons	57.43326	17.44521	3.29	0.001	23.241	127	91.62525	
sigma u	8.9384597							
sigma_e	3.1660409							
rho	88852504	(fraction	of varia	nce due t	о и i)			
	.00052504	TACTION		ice uue t	0 u_1/			

Figure 3. Multiple Linear Regression Model 3

but a negative relationship between these two variables is still observed. The p-value for this relationship does increase significantly from .022 to .098, making this result statistically insignificant because it has surpassed the value of .05 in model 3. With the addition of the control variable government spending in model 4, the coefficient between economic inequality and the interaction term increases just slightly once again from -.0048322 to -.0041895, and the p-value additionally increases to .158. Looking at the R^2

value for models 3 and 4, model 3 sees a decrease in the R^2 value from .1150 to .0789 which indicates that controlling for social security and welfare spending as well as trade volume produces a model that cannot account for variance in the variable economic inequality as well as a model without these controls. Model 4's R^2 value then increases to .1246 when controlling for government expenditure.

. xtreg ds_gin	ni autocracy	literacy aut	oc_lit wo	li_lngdpp	c wdi_lnpop	lngdp dem gessv	v pwt_openk	ea_exp
Random-effects	GLS regress	ion		Number	of obs	= 199		
Group variable	e: cowcode			Number	of groups	= 65		
B-sa:				Ohs ner	aroun			
within =	= 0.0835			005 pc1	group. min	= 1		
between =	= 0.0801				avg	= 3.1		
overall =	= 0.1246				max	= 12		
				Wald ch	i2(10)	- 16.96		
corr(u i, X)	= 0 (assume	(b		Prob >	chi2	= 0.0753		
	e (ussume	u /		1105		010700		
ds_gini	Coef.	Std. Err.	z	P> z	[95% Con	f. Interval]		
autocracy	.0002518	.2506883	0.00	0.999	4910882	.4915918		-
literacy	0207027	.0678541	-0.31	0.760	1536942	.1122888		
autoc_lit	0041895	.0029675	-1.41	0.158	0100056	.0016267		
wdi_lngdppc	1.558412	1.449008	1.08	0.282	-1.281592	4.398416		
wdi_lnpop	5028606	1.716562	-0.29	0.770	-3.86726	2.861538		
lngdp	4518908	1.223191	-0.37	0.712	-2.849302	1.94552		
dem	-2.649395	1.334058	-1.99	0.047	-5.2641	0346905		
gessw	7263959	.9344281	-0.78	0.437	-2.557841	1.105049		
pwt_openk	.0052268	.0269618	0.19	0.846	0476173	.0580708		
ea_exp	0587046	.0479762	-1.22	0.221	1527363	.0353271		
_cons	58.86027	17.18803	3.42	0.001	25.17235	92.5482		
sigma u	8.6387707							
sigma e	3.1708682							
rho	.88126976	(fraction	of variar	nce due t	o u_i)			

Figure 4. Multiple Linear Regression Model 4

Within the data analysis there were multiple notable trends. As control variables were added to the regression models, the central relationship between the dependent variable, economic inequality, and the interaction term, autocracy times literacy, became more statistically insignificant as more control variables were added. There was not a significant change in the regression results when GDP per capita, population size, and economy size were controlled for between regression models 1 and 2, showing that these factors likely do not have a significant impact on the relationship between education and economic inequality given the level of authoritarianism within a regime. However, between the second and third regression models, there was a significant change in the isolated relationships between economic inequality and literacy, and economic inequality and autocracy. This significant change in coefficients is likely due to the impact of control variables added in the model 3. Social security and welfare spending, as well as trade volume can have a significant impact on how education and authoritarianism impact economic inequality which is likely the reason for this significant change in these coefficients. Notably though, the coefficient for the interaction term does not see a significant change between models 2 and 3 other than a slight increase. Across all four models, each result becomes more statistically insignificant with the addition of control variables, but the interaction term sees the most change in the p-value. While these results are consistent with the presented hypothesis that level of authoritarianism impacts the effect of education level on economic inequality.

Chapter 6

Conclusion

The original hypotheses theorized that economic inequality within a country decreases as education level across the country increases. They also stated that a country with a democratic regime would expect these same results: economic inequality decreasing with education level increasing, but that an autocratic regime would see economic inequality continue to rise or remain stagnant rather than decrease, even with a rising level of education. One specific case presented was that of China which sees a rapidly rising educational attainment across their population due to a rigorous education system, but still sees economic inequality rising in a parallel fashion. It was then theorized from this and other countries with similar authoritarian regimes, that government type was influencing the impact that education level could have on decreasing economic inequality, especially when cases like Japan can be presented that see education rising and economic inequality declining under a democratic regime. Although the hypothesis that an increase in educational attainment negatively influences economic inequality, leading to a decrease in inequality, the hypothesis that poses authoritarianism as a causal mechanism of preventing education's effect on lowering economic inequality is not supported by the data analysis done in this study. With that being said, this topic warrants further future investigation in order to pinpoint why economic inequality does not reap the benefits of a growing highly educated population in some countries but not others in East Asia.

Appendix A

Descriptive Statistics

Dependent Variable – Economic Inequality

Mean estimatio	on		Number of obs = 290
	Mean	Std. err.	[95% conf. interval]
ds_gini	39.53184	.6299152	38.29204 40.77165

Figure 5. Variance in Dependent Variable-Economic Inequality

Independent Variable – Level of Authoritarianism

3,899	s = 3,89	Number of ob		n	ean estimatio
rval]	interval	[95% conf.	Std. err.	Mean	
37749	10.3774	9.94259	.1109122	10.16004	autocracy
•	10	9.94259	.1109122	10.16004	autocracy

Figure 6. Variance in Independent Variable-Level of Authoritarianism

Independent Variable – Education Level

lean estimatio	n		Number of ol	os = 2,768
	Mean	Std. err.	[95% conf.	interval]
literacy	66.58403	.4799418	65.64295	67.52511

Figure 7. Variance in Independent Variable-Education Level

BIBLIOGRAPHY

- Abdullah, Abdul Jabbar; Doucouliagos, Hristos, and Manning, Elizabeth. 2015. Is There a Kuznets' Process in Southeast Asia? *The Singapore Economic Review*, 60(2):1-22 *World Scientific*, doi: https://doi.org/10.1142/S0217590815500174.
- Ahluwalia, Montek S. Dec. 1976. Inequality, Poverty and Development. *Journal of Development Economics*, 3(4). <u>https://doi.org/10.1016/0304-3878(76)90027-4</u>.
- Anderson, Edward; Duvendack, Maren; Esposito, Lucio, and D'Orey, Maria Ana Jalles. Aug 2016. Does Government Spending Affect Income Inequality? A Meta-Regression Analysis. *Journal of Economic Surveys*, 31(4):961-987. https://doi.org/10.1111/joes.12173.
- Barro, Robert J. Mar. 1999. Inequality, Growth and Investment. *National Bureau of Economic Research*, https://doi.org/10.3386/w7038.
- Barro, Robert & Jong-Wha Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Cambridge, MA: National Bureau of Economic Research*, Working Paper no.15902.
- Barro, Robert J. 2008. Inequality and Growth Revisited. *Asian Development Bank, Manila*, Working Paper no. 11.
- Barro, Robert and Lee, Jong-Wha. 2013. Barro-Lee Educational Attainment Dataset, 1950-2010.
- Basdas, Ulkem and Celik, Sadullah. 2010. How Does Globalization Affect Income Inequality? A Panel Data Analysis. *International Advances in Economic Research*, 16:358-370. http://doi.org/10.1007/s11294-010-9281-0.
- Birdsall, Nancy. 2010. The (Indispensable) Middle Class in Developing Countries. *Equity and Growth in a Globalizing World*, World Bank, Washington, DC, 157–183.
- Birdsall, Nancy; Ross, David, and Sabot, Richard. Sept. 1995. Inequality and Growth Reconsidered: Lessons from East Asia. *The World Bank Economic Review*, 9(3):477–508. *Oxford Academic*, doi: <u>https://doi.org/10.1093/wber/9.3.477.</u>
- Boix, Charles. 2003. Democracy and Redistribution. *Cambridge University Press*, 171–203. https://doi.org/10.1017/cbo9780511804960.006.
- Brown, David S. Feb. 2002. Democracy, Authoritarianism and Education Finance in Brazil. *Journal of Latin American Studies*, 34(1):115–141. https://doi.org/10.1017/s0022216x01006307.
- Brown, David S. 1 Dec. 1999. Reading, Writing, and Regime Type: Democracy's Impact on Primary School Enrollment. *Political Research Quarterly*, 52(4):681–707. https://doi.org/10.1177/106591299905200401.

- Checchi, Daniele. 18 Nov. 2000. Does Educational Achievement Help Explain Income Inequality? *Inequality Growth and Poverty in an Era of Liberalization and Globalization*, 81–111. <u>https://doi.org/10.1093/0199271410.003.0004</u>.
- Choi, Changkyu. 24 Nov. 2006. Does Foreign Direct Investment Affect Domestic Income Inequality? *Applied Economics Letters*, 13(12):811-814. <u>http://doi.org/10.1080/13504850500400637</u>.
- Cin, Beom Cheol; Kim, Jongsung, and Lee, Hae-Young. Apr. 2013. Empirical Analysis on the Determinants of Income Inequality in Korea. *International Journal of Advanced Science and Technology*, 53:95-109.
- Cogan, John J.; Morris, Paul, and Print, Murray. 2016. Civic Education in the Asia-Pacific Region: Case Studies Across Six Societies. *Routledge*.
- Czap, Hans J. and Nur-tegin, Kanybek. Mar. 2012. Corruption: Democracy, Autocracy, and Political Stability. *Economic Analysis and Policy*, 42(1):51–66. <u>https://doi.org/10.1016/s0313-5926(12)50004-4</u>.
- Deltas, George. 2003. The Small-Sample Bias of the Gini Coefficient: Results and Implications for Empirical Research. *The Review of Economics and Statistics*, 85(1):226-234.
- Ding, Yanqing; Wu, Yinduo; Yang, Jin, and Ye, Xiaoyang. 2021. The Elite Exclusion: Stratified Access and Production during the Chinese Higher Education Expansion. *Higher Education*, 82(2):323– 347. https://doi.org/10.1007/s10734-021-00682-y.
- Dollar, David. 2007. Poverty, Inequality, and Social Disparities during China's Economic Reform. *Policy Research Working Papers*, https://doi.org/10.1596/1813-9450-4253.
- Emler, Trina E.; Zhao, Yong, and Deng, Jiayi. 2019. Side Effects of Large-Scale Assessments in Education. *ECNU Review of Education*, 2(3):279-296.

Eurostat. 2020. Education Database: All Education Levels, 2012-2018.

Feenstra, Robert C.; Inklaar, Robert, and Timmer, Marcel P. The Next Generation of the Penn World Table. *American Economic Review*, 105(10):3150-3182.

- Firebaugh, Glenn. Feb. 1980. The Case of the Missing-Values Card, and Other Mysteries: Another Look at the Effect of Government Spending on Income Inequality. *American Sociological Review*, 45(1):137-146.
- Frantz, Erica; Geddes, Barbara, and Wright, Joseph. 14 July 2014. Autocratic Breakdown and Regime Transitions: A New Data Set. *Perspectives on Politics*, 12(2):313–331. <u>https://doi.org/10.1017/s1537592714000851</u>.

Freedom House 1977. Freedom in the World Dataset 1977.

Freedom House 1978. Freedom in the World Dataset 1978.

Freedom House 2021. Freedom In the World Dataset 1980-2000, 2000-2010.

- Gallagher, Mary and Hanson, Jonathan K. 2009. Coalitions, Carrots, and Sticks: Economic Inequality and Authoritarian States. *PS, Political Science & Politics*, 42(4):667-672, 631. *ProQuest*, http://dx.doi.org/10.1017/S1049096509990096.
- Gasiorowski, Mark. 1996. An Overview of the Political Regime Change Dataset. *Comparative Political Studies*, 29:469-483.
- Gift, Thomas. 2015. Globalization and the Political Economy of Educational Inequality. Duke University.
- Halmos, Kornel. 2011. The Effect of FDI, Exports and GDP on Income Inequality in 15 Eastern European Countries. *Acta Polytechnica Hungarica*, 8(1):123-136.
- Holasut, Kanyarat and Sitthiyot, Thitithep. Jul-Dec. 2016. On Income Inequality and Population Size. *Thammasat Review of Economic and Social Policy*, 2(2):24-48.
- Huang, Xiao; Liu, Xin, and Yang, Jun. 2014. An Analysis of Education Inequality in China. *International Journal of Educational Development*, 37:2-10.
- Inkeles, Alex, and Sirowy, Larry. 1990. The Effects of Democracy on Economic Growth and Inequality: A Review. *Studies in Comparative International Development*, 25(1).
- Jaggers, Keith and Gurr, Ted Robert. 1995. Tracking Democracy's Third Wave with the Polity Data. Journal of Peace Research, 32:469-482. Polity IV dataset.
- Jones, Randall S. 11 Jun. 2007. Income Inequality, Poverty and Social Spending in Japan. *OECD Economics Department Working Papers*, No.556. https://doi.org/10.1787/177754708811.
- King, Dwight Y. Jan. 1981. Regime Type and Performance: Authoritarian Rule, Semi-Capitalist Development, and Rural Inequality in Asia. *Comparative Political Studies*, 13(4):477–504. doi:<u>10.1177/001041408101300406</u>.
- Li, Hui. 2021. The Relationship between Regime "Type" and Civic Education: The Cases of Three Chinese Societies. *Springer*.
- Madzinova, Renata. 2017. Impact of Government Spending on Income Inequality. *Annals of the University of Oradea, Economic Science Series*, 26(2):210-220.
- Marginson, Simon. Nov. 2018. Higher Education, Economic Inequality and Social Mobility: Implications for Emerging East Asia. *International Journal of Educational Development*, 63:4-11. Science Direct, <u>https://doi.org/10.1016/j.ijedudev.2017.03.002</u>.
- Marshall, Monty G. 24 Nov. 2014. The Measurement of Democracy and the Means of History. *Symposium: Measuring Democracy*, <u>https://doi.org/10.1007/s12115</u>.
- Mele, Gianluca; Sensini, Luca, and Scognamillo, Antonio. 22 Sep. 2016. Nonrenewable Resources, Income Inequality and Per Capita GDP: An Empirical Analysis. World Bank Policy Research Working Paper No.7831.

- Mello, de Luiz and Tiongson, Erwin R. 01 May 2006. Income Inequality and Redistributive Government Spending. *Public Finance Review*, 34(3):282-305. https://doi.org/10.1177/1091142105284894.
- Mo, Pak Hung. 06 Nov. 2003. Income Inequality and Economic Growth. *Kyklos*, 53(3):293-315, http://doi.org/10.1111/1467-6435.00122.
- Muller, Edward N. 1985. Income Inequality, Regime Repressiveness and Political Violence. *American Sociological Review*, 50:47-61.
- Organisation for Economic Co-operation and Development. 2020. Income Distribution Database. Paris: OECD.
- Organisation for Economic Co-operation and Development. 2020. PISA 2000-2010 Database. Paris: OECD
- Organisation for Economic Co-operation and Development. 2022. Social Spending (Indicator).
- Olson, Mancur. Sept. 1993. Dictatorship, Democracy, and Development. *The American Political Science Review*, 87(3), https://doi.org/10.2307/2938736.
- Park, H. Kang. May 2017. Education, Globalization, and Income Inequality in Asia. *Asian Development Bank Institute Working Papers*, ADBI working paper no.732.
- Rao, Jing, and Ye, Jingzhong. Oct. 2016. From a Virtuous Cycle of Rural-Urban Education to Urban-Oriented Rural Basic Education in China: An Explanation of the Failure of China's Rural School Mapping Adjustment Policy. *Journal of Rural Studies*, 47:601–611. https://doi.org/10.1016/j.jrurstud.2016.07.005.
- Richardson, J. David. Summer 1995. Income Inequality and Trade: How to Think, What to Conclude. Journal of Economic Perspectives, 9(3):33-55. doi:10.1257/jep.9.3.33.
- Shin, Kwang-Yeong. Sept. 2020. A New Approach to Social Inequality: Inequality of Income and Wealth in South Korea. *The Journal of Chinese Sociology*, 7(1) https://doi.org/10.1186/s40711-020-00126-7.
- Simpson, Miles. 1990. Political Rights and Income Inequality: A Cross-National Test. *American Sociological Review*, 5:682-93.
- Smith, Mark Kimura. 2021. Relationship Between GDP per Capita and Income Inequality. *Econometric Analysis Undergraduate Research Papers*, No.127.
- Smyth, Russell and Qian, Xiaolei. 2007. Measuring Regional Inequality of Education in China: Widening Cost-Inland Gap or Widening Rural-Urban Gap? *Journal of International Development* 20(2):132-144.
- Solt, Frederick. 2019. The Standardized World Income Inequality Database, v.8-9. *Harvard Dataverse, V5*.

- Sørensen, Georg. 4 Dec. 1993. Democracy, Authoritarianism and State Strength. *The European Journal* of Development Research, 5(1):6–34. <u>https://doi.org/10.1080/09578819308426577</u>.
- The World Bank. 2018. East Asia PISA Scores Dataset, 2000-2010.
- The World Bank. 2020. GDP Per Capita Growth Dataset, 1960-2020.
- The World Bank. 2020. General Government Final Consumption Expenditure, 1960-2020.
- The World Bank. 2018. Gini Index (World Bank Estimate), 1967-2018. data.worldbank.org.
- The World Bank. 2020. Population Size Dataset, 1960-2020.
- The World Bank. 2018. School Enrollment Dataset, 1960-2018. https://data.worldbank.org/topic/4.
- The World Bank. 2018. SEDLAC Time Series Dataset, 1974-2016.
- UNESCO 2020. Enrolment by Level of Education, 1970-2020.
- UNU-WIDER. May 2021. World Income Inequality Database (WIID). Version 31.
- Tomas, Vinod; Wang, Yan and Fan, Xibo. 2003. Measuring Education Inequality: Gini Coefficients of Education for 140 Countries, 1960-2000. Journal of Education Planning and Administration, 17(1):5-33.
- Vanhanen, Tatu. 2000. A New Dataset for Measuring Democracy, 1810-1998. Journal of Peace Research, 37(2):251-265.
- Zhao, Yong. 2016. Who's Afraid of PISA: The Fallacy of International Assessment of System Performance. *Leading Futures: Global Perspectives on Educational Leadership*, by Alma Harris and Michelle S. Jones, 7–21.

ACADEMIC VITA

Ava E. Delargy Email: avadelargy@gmail.com

The Denneylyania State University	University Darly DA
The remissivality state University	University Park, PA
College of the Liberal Arts Bachelor of Arts in International Politics	Class of 2022
Smeal College of Business Ennancea Minor in Business (25 creatis)	
Recognitions	
• Schreyer Honors College / Phi Eta Sigma Honor Society	1 1
• Paterno Fellow (Honors Program that includes advanced academic coursework and unde	ergraduate thesis.)
Protessional Experience	
Bourne, Noll & Kenyon Law Firm	Summit, NJ
Administrative Assistant	May 2021-Aug 2021
• Drafted and edited Wills, Power of Attorneys, and Living Wills for clients under the supe	rvision of full-time associates
• Drafted and edited Writ of Possessions, Order to Show Causes, and Verified Complaints a	and sent them to defendants
• Assisted senior partners with ad hoc assignments such as preparing documents for client r	neetings and scheduling conferences
Kestorative Justice Initiative	University Park, PA
Intern	Jan 2021-May 202
• Conducted research to catalogue all carceral education programs in partnering with PA Re	eentry Council-Education Subcommittee
• Researched for and wrote two blog posts concerning the racial disparities in education lev	el in incarcerated populations
• Organized Justice Education week which nosted 20+ speakers and 200+ participants as w	ell as led the promotions sub-committee
River Delta Law Firm, Snangnal Office	Snangnal, China May 2010, July 2010
Payised and edited legal documents and legal advice articles for the annual publication	May 2019-July 2015
Composed emails sent to international clients which consisted of disclosure documents.	ourt decisions and appointment dates
 Presented to senior partners on the fiscal feasibility of expanding to include a second inter 	mational branch
Midterm Elections (Precinct 67 Patton South 2)	Centre County PA
Flection Clerk	Nov 2018
• Verified and reported the vote count for the precinct and completed paperwork for the fed	leral, state, and county procedures
Relevant Experience	·····, · ····, · ···· · · ···· · · · ··· · · · · · · ·
Penn State University Panhellenic Council	University Park, PA
Recruitment Counselor	Sept 2021-present
• Oversaw a group of 30+ women entering sorority recruitment and offered advice and supp	port throughout the process
Associated Student Activities	University Park, PA
Administrative Assistant	Dec 2019-presen
· Assisted customers, counted and handled monies, processed purchase orders, took deposit	ts, reviewed and coded check requests,
and prepared checks for mailing, filing, and handled other duties as assigned	
· Managed 1000+ university organization bank accounts, created and processed contracts for	or off-campus services for organizations
Alpha Omicron Pi Sorority	University Park, PA
Vice President of Finance	Oct 2019-Dec 202
 Managed an \$100,000+ budget for the organization as well as created the budget for the 2 	2020-2021 fiscal year
 Processed/printed checks as well as kept track of dues being paid by members and gave fit 	nancial advice to other officers
Penn State Study Abroad Program	Shanghai, Chin
Intern/Student	May 2019-July 2019
• Lived and worked in Pudong, Shanghai for 2.5 months; completed a 2-week intensive Ch	inese language course
Liberal Arts Ambassadors	University Park, PA
Executive Board Treasurer	Oct 2018-April 202
• Creating and balanced the annual budget (\$5000), and oversaw the allocation decisions for	or organization events such as speakers
Kesearch Experience	
Schreyer Honors College Undergraduate Thesis	University Park, PA
Senior Thesis (In-Progress)	Aug 2020-present
• Conducted research on the impact of education and economic inequality given the level of	authoritarianism in East Asian regimes
Volunteer Work	
Penn State Alternative Breaks Weekend Service Trip	Baltimore, MD
Volunteer	Oct 2019 (3 days

· Worked on nature trail for a special education school and assisted low-income urban gardens to address food insecurity