



Inequality in the Southern Cone: A Northian Analysis of Political and Economic Stability
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I. Introduction

The commodity boom of the mid-2000s saw prices of commodities increase after two decades of relatively depressed prices, in large part due to the rapid industrialization of several East Asian nations (Gruss 2014; Adler and Sosa 2011). Commodity prices are notably volatile, even during booms and busts, and as of 2008, 95 out of 141 developing world countries relied on the export of primary commodity prices for over half of their foreign exchange reserves (Brown, Crawford, and Gibson 2008). Commodity dependence in South America is significant, with 10Percent of GDP deriving from exports of primary commodities (Adler and Sosa 2011). This paper will be a quantitative case study of Argentina, Brazil, and Chile that looks to examine the relationship between the prices of their most relied upon commodity exports and the level of income inequality in each country. For this study, income inequality, as measured by the GINI coefficient, serves as a measure of political and economic stability. The study will look at three time periods. First, the period from 1992 to 2002, known hereafter as the pre-boom period. Then, from 2003 to 2014, the years of the boom. Finally, an analysis of the post-boom years with policy recommendations and future insights. Scholars have disagreed over some of the primary causes of the progress that has been made in reducing inequality in recent years. Some propose that the inclusive nature of democratic institutions, improvements in education, and technological advancements have created more equal societies (Lopez-Calva, Nustig 2010 Ch.1). Conditional and unconditional cash transfers and improving labor market institutions have ameliorated income inequality. Others have seen that the increase in rents from commodities have had mixed overall effects depending on how diversified the commodities are and which kind of commodities are extracted (Salas 2016). Overall, this paper will investigate the relationship between the price of the commodity that makes up the largest share of the overall commodity production of Argentina, Brazil, and Chile, soybean, iron ore, and copper ore, respectively, and income inequality, used as a proxy for political and economic stability over a period from 1992 to 2014. All three countries saw dramatic economic growth over this period, as well as reductions in their GINI Coefficients, allowing more people to enjoy the vast mineral and overall resource wealth equitably. The causes and sustainability of such stability remain in question. After a decade of leftist rule by the Kirschners in Argentina, current President Mauricio Macri won the 2015 elections, despite not being the candidate supported by Cristina Kirschner, the then popular outgoing president. Macri instituted neoliberal reforms by decree to improve the country's woeful economic situation. In Brazil, economic policy remains focused on extractive enterprises, while the political system remains marred by constant ongoing investigations of presidents and members of Congress. Chile after years of center-left governance under Concertacion, elected a candidate from the center-right coalition. Chile appears to have achieved economic stability, yet income inequality remains a significant issue.

Institutions are the formal and informal constraints that define not only daily life but all modes of economic and political transaction (North 1990). These institutions behave in a hierarchical manner and most commonly change incrementally, although sometimes they are altered abruptly, in the case of revolution or significant regime change. The agents of change are individuals who are responding to the incentives created by the institutional framework (North 1990). Incentives change when relative prices or preferences change. Stability is achieved when

a complex set of rules exists in a hierarchy with each set of rules on the ladder costlier to change than the previous set. Institutions are more difficult to change as one goes up in the hierarchy. Institutions shape the behavior of economic and political entrepreneurs and help explain economic outcomes. When formal rules are not respected, when the government or government actors are free to act with unlimited discretion, or when property rights are weak and corruption high, the allocation of resources reflect it (Chong and Zanforlin 2004). North's research studies the relationship between institutions and economic growth. This study analyzes the institutional frameworks of each country, tracks institutional changes during the commodity boom and theorizes that such changes, in tandem with policy, led to decreases in income inequality in the Southern Cone by applying North's theories at the nexus of macroeconomic policy and political entrepreneurship. This paper will first examine North's theories and their relevant application, then detail the political and macroeconomic conditions in each country over the period, and then conclude with an empirical analysis.

II. An Overview of Northian Theory

Institutions are difficult to change for four reasons (North 1990). First, actors have imperfect information and are faced with multiple solutions with indeterminate outcomes. Second, norms and rules that create more efficient outcomes often lose out because they have difficulty gaining adherence. Third, once norms and constraints are set, they are difficult to exit from. Finally, a series of small events and chance circumstances can determine solutions that lead down a particular path. Unproductive paths persist because institutions that encourage rent-seeking and provide disincentives to productive activities create organizations and interest groups with a stake in maintaining the existing constraints, shaping the polity in their image. Institutions that reduce transaction costs through reductions in rent-seeking corruption, the protection of property rights, and adherence to formal rules also reduce costs to bargain with elites for further incremental changes in the complex hierarchy of rules.

Northian institutional theory suggests that path divergence is critical to understanding differences in institutional outcomes, using the relative paths of the United Kingdom, Spain, and their former colonies as examples. Spanish and Portuguese colonial institutions were based around a strong central bureaucracy and rigid classes. The governments of nascent states following Latin America's revolutionary wars of the early nineteenth century strongly reflected their colonial institutions, despite setting up formal constitutions that were nearly identical to the U.S. Constitution. The difference in outcome is explained by enforcement, adherence, and understanding of the formal constraints by the elite classes that ruled these countries (North 1990). These rulers were inclined to defend their narrow interests instead of furthering productive activities for two reasons: first, they face competitive constraints that encourage them to establish property rights that benefit powerful interest groups and; second, enforcing efficient property rights is costly, and thus they would not benefit in terms of personal revenue. As such, elites are constrained to granting monopoly rights instead of encouraging competition (North 1981). This leads to a deadlock that explains why institutional change is slow and rarely leads to efficient outcomes. Rulers are needed to establish institutions that can facilitate market exchange, yet they fail to provide an ideal structure because they typically represent the interests of powerful stakeholders who are generally satisfied with the status quo (Faundez 2016). Thus, disseminating bargaining power throughout the general population is vital to creating institutions that are as efficient, and often by extension, as inclusive as possible to address income inequality and boost economic growth.

North provides a system for assessing the development of states at the nexus of politics and economics that is particularly useful for assessing the effect of the commodity boom on political development. All modern states fall into one of two categories: open-access orders (OAOs) or limited-access orders (natural states) (North, Wallis, Weingast 2009). OAOs are developed successful market economies which all have the following characteristics: first, a wide spread belief in inclusion and equality; second, no barriers to entry for economic, political, and educational activities; third, a willingness to establish organizations to further the aforementioned activities; fourth, impersonal exchange; fifth, impartial enforcement of the law; and sixth, democratic control over the military. Natural states have thusly failed to control the use of violence and are unable to guarantee favorable conditions for economic activity. Typically, elites in natural states have access to violence and other special privileges, and while they may engage in some productive activities, they fail to guarantee secure property rights, enforce the law impartially, or do not establish conditions conducive to economic efficiency and equality. North et al. classifies natural states as either fragile, basic, or mature. Mature natural states can hope to ascend to become an OAO when they establish rule of law for elites, organizations in the public and private sector whose influence lasts beyond the life of its founder, and consolidated civilian control of the military. Elites begin disseminating what originate as privileges into impersonal rights when it is in their interest to do so, either because through economic self-interest or to maintain political or physical survival. This system of classification and criteria and understanding of institutional change is useful in tracing and categorizing the institutional systems and incremental change of Argentina, Brazil, and Chile's institutions over time. Studies conducted to determine effective ways of overcoming dependence on natural resources have emphasized the importance of formal and informal rules including transparency, robust and clear rule-building, and separation of powers in government (Moreen 2006; Eifert, Gelb et al. 2003; Schneider and Heredia 2003; Lederman, Loayza et al. 2005).

III. The Pre-Boom (1991-2001)

A. Argentina

The pre-boom period firmly entrenched Argentina's democracy after decades of insecurity and military coups. The military dictatorship of the 1980s and the deaths caused by it firmly turned public sentiment against dictatorial rule. Defeat in the war for the Malvinas against the United Kingdom effectively eliminated the political capital and credibility of the military government. A civilian government led by democratically-elected President Raul Alfonsín came to power in 1983. President Raul Alfonsín's term was cut short due to unrest stemming from inflation and the government's overall wariness regarding the prosecution of former military officials. The government was cautious in its prosecution of military officials involved in the "Process of National Reorganization", the military's dirty war carried out against any elements of society perceived as being to the political left, which resulted in the disappearances of approximately 30,000 people. Alfonsín's government, perhaps rightfully so, feared that extreme action taken against the military would result in another military coup. Alfonsín, as the spearhead of democratic and capitalistic neoliberal reforms, suffered from an inability to maintain his support without ruling by decree, as was common among Latin American and Eastern European countries in this period (Przeworski 1990). Alfonsín failed to complete his term, and Carlos Menem ascended to the presidency in 1989. Menem, a self-proclaimed Peronist who styled himself as a caudillo, hardly resembled the Peronists of the past. He continued the practice of

rule by decree that was common across Latin America, keeping Argentina's Congress and provincial governments weak. The destruction of Peronism carried out by the military government, and the overall malleability of the ideology, gave Menem a clean slate to carry out a new policy agenda. He engaged in mass privatization and increased the number of Supreme Court judges from five to nine to avoid judicial opposition. Congress was mostly powerless to prevent any of Menem's reforms. Menem left office in 1999 with his administration faltering and the economy entering a recession. Menem tried to run for a third-term, despite the Argentine Constitution's restriction against it. He vowed to run again 2003. Menem had a blatant disdain for institutions of Argentina, frequently trying to circumvent them, eroding government trust and stymying democratic development. After Menem's departure, the country was led by Fernando de la Rúa, supported by the centrist party of former President Alfonsín, and the center-left party FrePaSo in 1999. De la Rúa's presidency was short due to the now hopeless situation presented by the Argentine financial crisis. Riots and cacerolazo, protests involving the banging of pots and pans, became widespread, with property destruction often aimed at banks and American and European companies. A multitude of presidents followed his resignation and the government's default on its debt in 2001, none of which held power for a meaningful amount of time before the 2003 elections.

The military dictatorship of the late 1970s and early 1980s favored protectionist policies, effectively removing Argentina from international markets. The economy stagnated and suffered under these conditions, giving way to democratic governance first under Alfonsín. The country narrowly avoided defaulting on its sovereign debt in 1982. Alfonsín started the process of privatization and liberalization that would be furthered by Menem through further privatization, spending cuts, price and wage freezes, and a new currency, the Austral. The IMF and World Bank helped Argentina service their debts until 1989. This, coupled with the lack of U.S. dollars in the Argentine Central Bank, contributed to an increase in inflation, which became hyperinflation when the austral was devaluated in early 1989. Menem began his term late in 1989, and proceeded to embrace the Washington Consensus, a set of neoliberal policies that emphasized reduced government expenditures and taxes, free trade, and privatization. Congress provided Menem with unlimited privatization powers, which he used to privatize phone companies and airlines. The Convertibility Plan was introduced, setting the new Argentine peso at a fixed one-to-one price with the dollar. Free trade increased, and inflation rates were reduced. The economy began to experience rapid growth. Unemployment increased to over 10Percent as newly privatized companies forced many employees out of work to remain profitable. Unions were effectively powerless, and low-income demographics were vulnerable to the increase in taxes. Argentine companies failed to make significant gains in international markets, and the trade deficit grew markedly as foreign goods and capital entered the country. The country de-industrialized, and dollars left the country to purchase cheap imports. Wealthy Argentines evaded taxes and deposited money into offshore banks. By 1999, global financial crises eroded several currencies of direct competitors, including the Brazilian Real, further weakening Argentine exports. Complementary currencies began to emerge as de la Rúa refused to abandon the convertibility plan. Fernando de la Rúa began carrying out austerity measures to prevent bankruptcy. Argentina's credit rating fell in July 2001, and increasing austerity led to social unrest throughout Argentina. A run on the banks began in late 2001, with Argentines withdrawing substantial amounts of money and sending it offshore. This led to the corralito, the freezing of all bank accounts for twelve months to prevent even more capital flight. Only small sums could be withdrawn during this time. Finally, in late December 2001, Argentina defaulted

on its public debt, amounting to \$132 billion. The fixed exchange rate would end in January 2002, with all bank accounts denominated in dollars being converted to pesos at the exchange rate, which continuously decreased. Known as the *pesificacion*, this act, along with the *corralito*, eroded trust in Argentina's government. The government failed to protect property rights as it seized its citizens savings accounts. Unemployment figures were nearly 25Percent. The entire country was in a state of panic and devastation. Seven out of every ten Argentine children were below the poverty line by early 2002.

B. Brazil

Brazil's colonial history is different from Argentina's and Chile's and the differences affect the structure of their political institutions. Argentina and Chile are relatively homogenous societies in terms of race. Both countries were backwater regions of the Spanish Empire due to their inability to grow meaningful cash crops, and relatively diminutive amounts of gold and silver. The development of exploitative and non-democratic institutions has been connected to the presence of specific commodities, especially in Latin America, since many extractable commodities require labor in the form of slaves (Sokoloff and Engermann 2000). Brazil seceded peacefully from the Portugal early in the nineteenth century, and Portuguese colonial institutions remained intact. The Empire of Brazil maintained slavery as a legal practice until 1888, when Brazil began transitioning to an illiberal democracy. From the country's inception to the present, socioeconomic classes in Brazil are heavily based in race, with levels of poverty and education correlating with race (Pereira 2016).

Brazil's transition from a military regime to a democratic government began in 1985 with the last military dictator, Joao Figueiredo, instituting a general amnesty and a mission to institute the *abertura*, a process of democratization that emphasized an opening of the political system. However, the process was not without bloodshed. Extreme elements within the military government carried out terrorist bombings. The bombings strengthened the public's resolve to oust the military government. In 1984, the opposition party, Brazilian Democratic Movement Party proposed to directly elect the president, seizing the opportunity presented when public demonstrations were held in Brazilian cities. Eventually, an alliance was built between the opposition and some members of the pro-government Democratic Social Party, founding the Liberal Front Party (PFL). Their candidate Tancredo Neves won the election of 1985, but fell ill the night before his inauguration, dying a month later. His successor, the Vice President Jose Sarney was a long-time supporter of the military regime. The Brazilian government did carry out liberalization processes, culminating in the 1988 Constitution, which restored civil and public rights, economic rights, democratic elections, and the right to healthcare. It created a federal system, strengthening sub-national governments. In 1990, Fernando Collor de Mello was elected to the presidency. He would later resign to avoid the penalties of impeachment due to corruption, but was found guilty anyway, and subject to a suspension of his political rights for eight years. He was later acquitted of criminal charges. The election of 1995 saw Fernando Henrique Cardoso, a well-known Brazilian academic, ascend to the presidency through the support of a broad coalition of parties. His administration was far from stable, and the parties that comprised his coalition were rarely disciplined in their voting. He continued a process of privatization and instituted numerous cash transfer programs that helped ease Brazil's inequality, including *Bolsa Escola* (school bag) and *Auxilio Gas* (gas help). Despite the expansion of the safety net, his penchant for privatization resulted in his association with neoliberalism. He was unpopular among elites and the people alike, despite his lowering of inflation. The Brazilian Constitution is

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easy to amend, with the Constitution of 1988 allowing the president to unilaterally propose amendments, which are then voted upon by both houses of the National Congress. Amendments need three-fifths of the members to vote in favor to take effect. Using this power Fernando Henrique Cardoso allowed himself to serve a second term, continuing the precedent for constitutional amendments designed to serve those in power in Brazil, undermining long-term political stability and economic health in Brazil.

Brazil's military government instituted highly protectionist policies with the long-term goal of carrying out import-substitution industrialization (ISI). The Brazilian economy grew markedly during the early periods of the dictatorship. However, by the end of the 1980s, the economy suffered from high inflation and stagnant growth. Several domestic industries were unable to provide consumer goods on par with those of foreign industries. Brazil was also faced with a massive public debt and only a limited capacity to issue more debt instruments. Collor's administration then aimed to liberalize the Brazilian economy, allowing for increased competition and privatization. Inflation was curbed through a wide-reaching stabilization plan that froze financial assets, froze bank accounts of more than \$1,000, froze prices, dismantled several government agencies and introduced new provisional taxes. The results were weak in part due to the administration's inability to garner political support (Przeworski 1990). Political instability increased, and overall output declined from 1990 to 1992. Despite growth in 1993, inflation remained high. The next plan, known as *Plano Real*, devised by the then Minister of Finance, Fernando Henrique Cardoso, introduced an equilibrium budget, a general indexation, and the introduction of the Brazilian real, which was pegged to the dollar. Inflation fell to acceptable levels, and the real appreciated, making Brazilian goods more expensive on the international market, creating large account deficits, which were ameliorated by the influx of foreign currency as economic stability returned to the country. By 1999, the Real was a free-floating currency, devaluation occurred, and the economy, with the support of a \$41.5 billion support program instituted by the IMF, continued to grow, as investors were reassured of Brazil's viability despite the ongoing crises in Asia and Argentina. Poverty decreased markedly, and Brazilians began enjoying a higher quality of life.

C. Chile

The pre-boom period in Chile saw a return to democratic government after 17 years under the military dictatorship of Pinochet. A 1988 plebiscite was held, and the public decided to return to civilian government using an amended version of the 1980 Constitution that set up more robust democratic government machinery. Like Argentina, Chilean democracy was firmly entrenched, with the general public expressing outrage at the crimes committed by the Pinochet government. In 1990 Christian Democrat Patricio Aylwin, a member of a coalition of 17 center-left political parties known as the Concertación, won the presidential elections. The Concertación was the dominant force in Chilean politics until its dissolution in 2013. It won every presidential election from 1990 to 2010. In 1991, Aylwin's administration began investigations of disappearances perpetrated by the Pinochet government. Pinochet was later arrested and put on trial, which continued until his death in 2006. Government spending on social programs was increased under the center-left governments during the 1990s and tax revenues increased concurrently. Poverty fell through the 1990s. Labor unions enjoyed increased power and relevance under a new Chilean labor law. The Chilean government also instituted capital controls that helped limit the effects of the Latin American financial crisis of the late 1990s. Transitions of power were

peaceful, and Chile achieved relative stability through the pre-boom era while Argentina and Brazil suffered through chaotic periods.

IV. The Boom Years (2002-2013)

A. Argentina

In 2003, Argentina elected Nestor Kirchner to the presidency in a narrow election. Kirchner was a Peronist of the Justicialist Party (PJ), which had come to dominate Argentine politics during the commodity boom. Kirchner was elected with a small percentage of the vote, as his closest rival, Carlos Menem, refused to participate in the run-off. Kirchner attempted to make allies across party lines, a philosophy referred to as “transversalism” in Argentine politics. Kirchner created an anti-establishment image, despite the fact his administration was still manned by the political class. Kirchner also worked to reform the judiciary, removing the judges that Menem appointed when he added four judges to the bench to pass his reforms unopposed. These moves were popular, but insignificant, as the national government routinely ignored rulings that were not in accordance with their policies. Kirchner also placed a rhetorical emphasis on assisting the poor, increasing unemployment benefits and social welfare in general with many cost-of-living industries being subsidized by the government. Kirchner’s government also began to influence Argentina’s National Institute of Statistics and Census of Argentina, encouraging the organization to under-report inflation and poverty numbers. Kirchner’s administration also made what was known as the “superpowers law” permanent. Originating during the previous economic crisis, the law essentially allowed the executive body to make significant changes to the budget without the approval of Congress, a significant breach of the ideal separation of powers. In 2007, Kirchner declined to run for reelection, and his wife, Cristina Fernandez de Kirchner ran and was elected in his stead. The Kirchners had developed a powerful sense of personalism in Argentine politics, and their supporters, known as Kirchnerists, followed Kirchnerism. Personalism and support for the Kirchners allowed Cristina to effectively rule by decree, and many of her supporters proposed amending the constitution so that she may run for a third term. Opposition across several sectors made it impossible for her to do so. Several corruption scandals that enriched the Kirchners hurt their public perception, and Cristina looked to undermine the media at every available term, leading to the nationalization of soccer broadcasts and pro-government commercials playing throughout the matches. She launched a legal campaign against *Clarín*, Argentina’s most widespread news outlet. The Kirchners also continued to carry out the prosecution of military officials guilty of human rights violations from the Dirty War. Argentina unveiled its Programa Familias in 2002, a conditional cash transfer program for families with children. Benefits are provided through a bank account with a debit card. Recipients must enroll their children in school and comply with the National Immunization Plan (World Bank CCT Program Profile Argentina 2018).

Argentina enjoyed significant economic growth during the commodity boom, in some part thanks to the increase in soybeans and its derivative products. From 2010 to 2012, soybean products comprised 51.5Percent of Argentina’s total commodity exports (Gruss 2014). The Kirchner government relied heavily on export taxes throughout the mid-2000s, comprising between 8 and 11Percent of all tax receipts, and two-thirds came from the export of soybean products (Richardson 2008). Nestor Kirchner’s government re-nationalized several sectors of the economy, including the national postal service, railways, water utilities and Aerolineas

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Argentinas, the country's premier airline, reversing the extreme privatization of the Menem administration. Argentina began issuing five-year bonds for purchase by foreign investors for the first time since the crisis. The government also began meddling in the publication of inflation statistics in the boom period, with independent economists attempting to publish more reliable statistics threatened with prosecution. The Great Recession slowed Argentina's economic growth to 0.8 percent, before growth resumed in 2010. Cristina Kirchner nationalized private pension funds for approximately \$30 billion. The government began a period of austerity in 2012 due to concerns that the economy was overheating. Rising inflation and capital flight led to the imposition of capital controls in June 2012, and a black market for dollars grew. Inflation grew steadily, reaching 38 percent by 2014. By the presidential election of 2015, Argentina was at a crossroads, and entered a recession in the early to mid-2010s.

B. Brazil

In 2002, at the dawn of the commodity supercycle, leftist Luis Inácio Lula da Silva won the presidency as the candidate of the Workers' Party. Widely popular, Lula emphasized the importance of social programs and development. He instituted the Growth Acceleration Plan to invest in Brazil's infrastructure and provide fiscal stimulus. He combined Brazil's conditional cash transfer programs into one robust program, Bolsa Familia, in 2003. Benefits are distributed through a debit card and 11.1 million families are on the rolls (World Bank CCT Program Profile Brazil 2018). Bolsa Familia provides adults with literacy education for those with less than four years of schooling. The conditions include vaccinations and regular check-ups for children age six or less, regular check-ups for pregnant women, regular school enrollment for all children of school age, and participation in parent-teacher meetings. The Brazilian economy enjoyed growth and a new presence in foreign relations. Unemployment and inflation were consistent and under control, the government collected taxes more efficiently, and exports increased. Despite initial fears that Lula would default on the debt, the country received a credit upgrade and banks made record profits. The middle class enjoyed growth and extreme poverty was reduced markedly. Lula's administration was plagued by corruption scandals, including the Mensalão scandal, in which numerous officials, including Lula himself, were implicated. Lula escaped with his approval and credibility intact, but many of his allies and other top officials faced charges and indictment. He survived his two terms in office in part because he was immensely popular. Lula is in prison after his conviction on corruption charges levied after his presidency as part of Operação Lava Jato, which has resulted in 150 Brazilian politicians or business persons convicted for corruption.

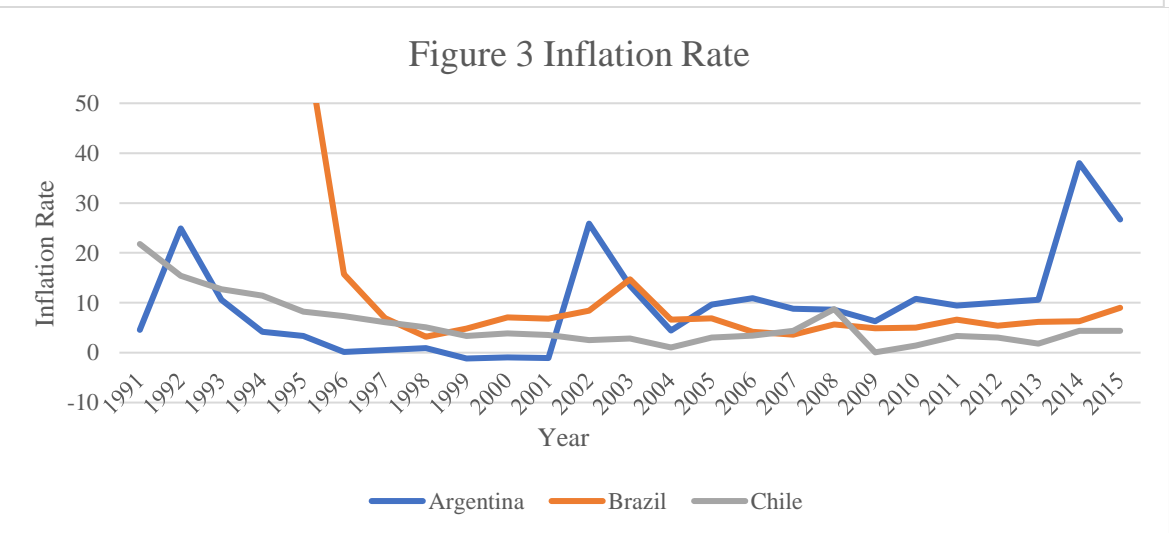
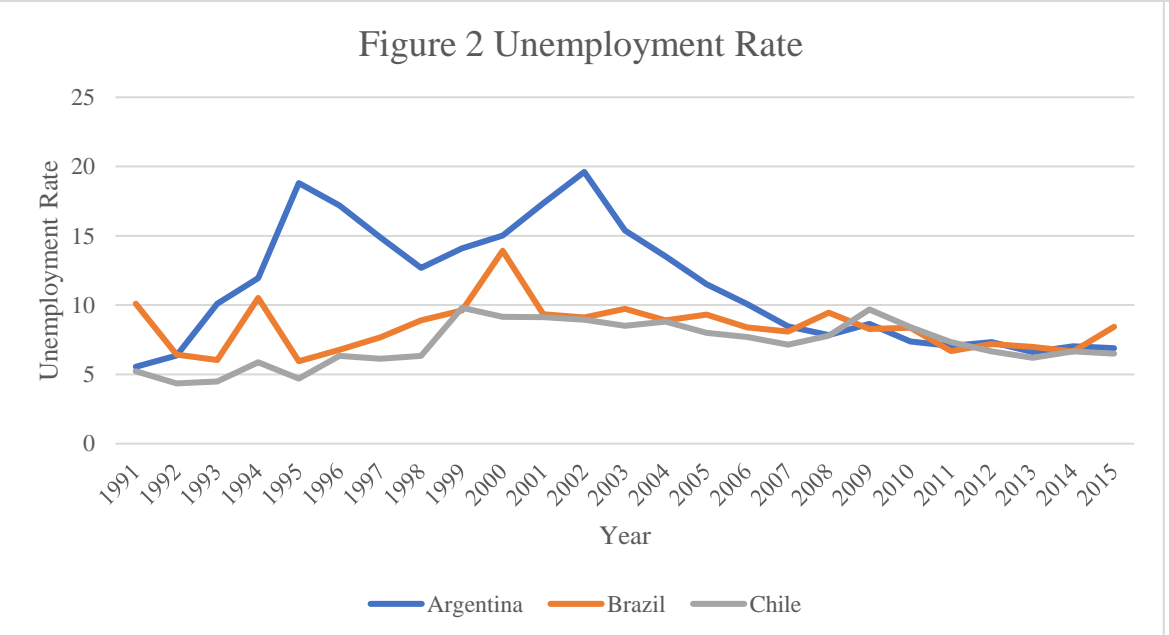
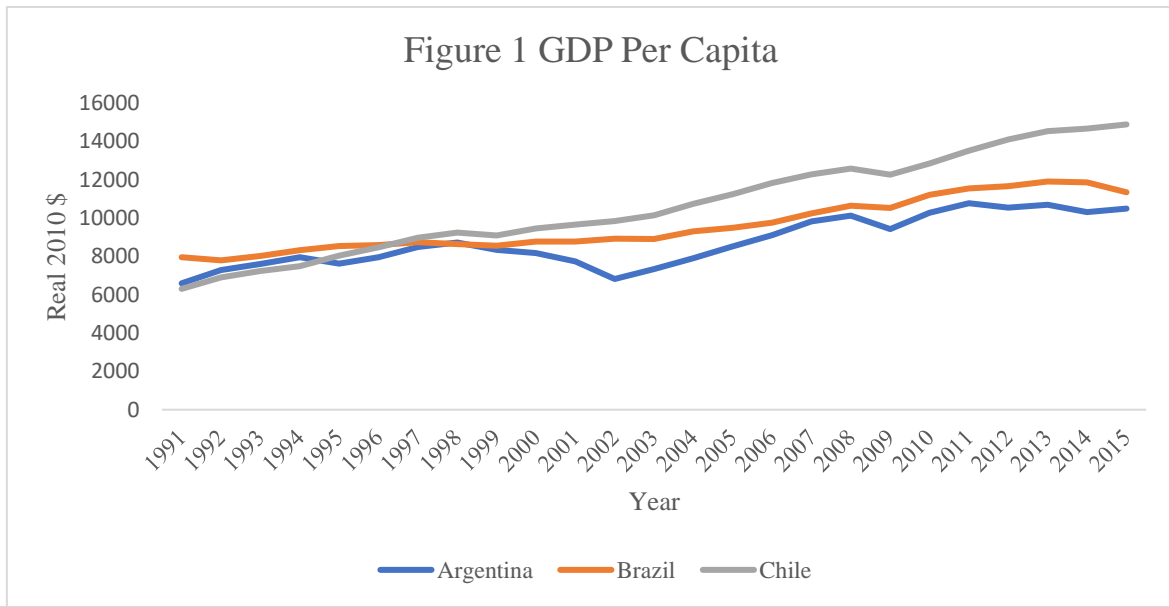
C. Chile

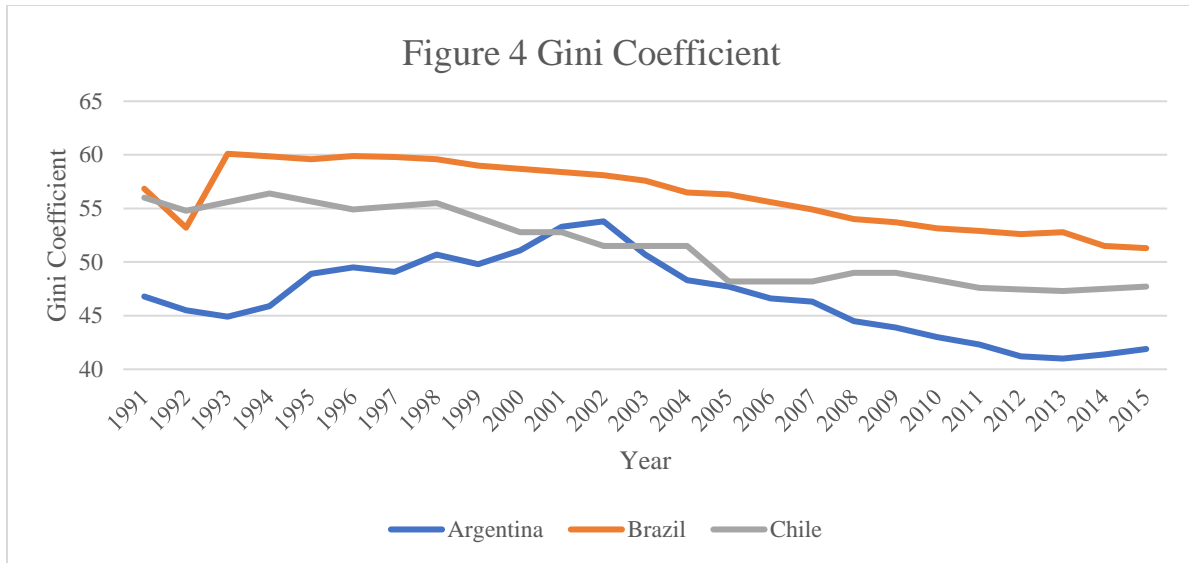
Chile enjoyed a stable political system during the commodity boom. The handling of corruption cases was swift and just. The president in the early period, Ricardo Lagos, was popular. He continued the prosecution of Pinochet and others found guilty of human rights offenses during the military dictatorship. In the early years of his term, Lagos faced high unemployment and promised to maintain fiscal responsibility and low inflation rates. He achieved all three aims. In 2002, he established Chile Solidario, the country's primary conditional cash transfer that targets the poorest Chileans. Chile Solidario provides personalized assistance in areas such as health, employment, housing, family life, legal documentation and education (World Bank CCT Program Profile Chile 2018). The program disburses payments through the National Social Security Institute. It joins the Subsídio Unitario Familiar, established in 1981, which provides

\$10 per month to poor families in exchange for regular medical check-ups and regular school attendance for children. In 2006, Michelle Bachelet was elected to the presidency. She focused on closing the gap in private and public education in the country, and created the Economic and Social Stabilization Fund, a sovereign wealth fund that allowed her to finance social policies and provide economic stimulus packages from money accumulated through fiscal surpluses. During the boom era, inflation remained relatively consistent, with a maximum of 8.76 percent in 2008. Inflation typically hovered around one to three percent. Unemployment steadily decreased from 8.94 percent in 2002 to around 6 percent by the end of the boom. The state had an influx of cash thanks to increased tax revenues, and exports steadily increased during the boom years. Chile's economy was largely stable, with the global financial crisis of 2008 serving as the only catalyst for economic slowdown.

Figure 1 displays GDP per capita over the years, comparing all three countries. The three countries show similar growth patterns over the period of study. Figure 2 demonstrates the unemployment rate in all three countries in the study years. Noticeable variations occur in Argentina and Brazil. Chile's unemployment rate remains relatively stable. Figure 3 measures inflation rate. Note Brazil's inflation rate starts in the thousands and only decreases to a level that is readable on the graph in 1996. Argentina's inflation fluctuates rather intensely, and the period of interest follows a period of rampant hyperinflation in Argentina. Chilean inflation steadily declined throughout the period. Figure 4 measures the Gini coefficients. All three countries saw reductions in inequality that tapered off towards 2015, even increasing in Argentina and Chile.

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V. Literature Review

There is some debate among scholars as to the effects that changes in commodity prices have on income inequality, as well as debate among scholars as to what has been driving the recent downturn of income inequality in Latin America. Some scholars argue that previous commodity cycles have left the countries dependent on them worse off than they were previously. Others discount, or at least omit, the value of commodity prices in measuring income inequality in countries that are dependent on them.

A. Scholars who believe Commodities Have Contributed Reduced Inequality

The Economics of Contemporary Latin America provides an overview of the region's economic history from the import-substitution model of industrialization to the present day. Within, the authors recognize that, while commodity booms have previously had an adverse effect on income inequality in Latin America, the commodity boom of the early 2000s had the opposite result. Countries became less poor, less unequal, and overall more stable than in other periods of great commodity price volatility. Vibrant middle classes and infant democracies were born and supported by expanding social programs over the course of early 2000s, creating more stable societies relative to those of Latin America of the 1980s. The boom in commodity prices, supported the ability of Latin American governments to carry out such policies (Armendariz and Larrain 2017).

What is the Effect of Commodities Prices on Inequality? A comparative Study with a Focus on Latin America from 1990-2014, by Carlos Delgado Salas examines the effects of rents received from commodities across Latin America to examine the effect they have on inequality regionally. His findings suggest that some commodities, specifically minerals and coal derive rents that are harmful to income inequality because profits are typically earned by middlemen, failing to allow producers to enjoy the increased global market prices. Rents from agriculture typically end up being enjoyed by the primary producers themselves (Salas 2017). Either way, increases in rents result in increases in taxable incomes, allowing governments to carry out redistributive policies. Both agree that commodity prices are impacting the current trend of reduced income inequality in Latin America, also acknowledging government social spending policies that aimed to reduce

poverty and inequality. The findings of Moncarz, Barone, Calfat, and Descalzi regarding Argentina corroborate these findings. Their simulations and research show that Argentina benefited greatly in terms of poverty and inequality from the increase in agricultural commodity prices (Moncarz, Barone, Calfat, and Descalzi 2014). *Income inequality and the oil resource curse* examined the effect of oil on cross-country levels of income inequality and found that extraction of oil is associated with lower income inequality, except in the most endowed oil states, whom often under-report their income inequality data. (Parcerro and Papyrakis 2016).

B. Scholars that emphasize Democracy, Improvements in Education, and Conditional Cash Transfer Payments

Another group of scholars contend that the main drivers of decreases in income inequality come from democratic reforms and inclusivity and education expenditures. One study of the decline in Latin American income inequality throughout the 2000s, titled *What is behind Latin America's decreasing Inequality?* finds that some solutions to addressing Latin American inequality include improving the access to education, liberalizing foreign direct investment policies, and increases in tax revenue. Increases in tax revenue fall somewhat in line with the thoughts of the commodity-based thinkers, who see rents from commodities as an opportunity to increase tax revenue through more progressive tax systems, which are then used to improve social programs (Tsounta and Oseuke 2014). *Explaining the Decline in Inequality in Latin America: Technological Change, Educational Upgrading and Democracy* focuses on the importance of democratic transitions and the diffusion of power they started across Latin America. Advanced democracies typically engage in inclusive, redistributive policies, as well as improvements in labor market institutions. These advancements result in an increase in access and quality of education, which previously mentioned thinkers, including those who emphasize the importance of commodities, subscribe to. (Lopez-Calva and Nustig 2010 Ch.1). *Development Strategies and Law in Latin America: Argentine, Brazilian and Chilean Conditional Cash Transfer Programs in Comparative Perspective* provides an analysis on the effectiveness of cash transfer payments in both countries of interest and Chile. The research findings indicate that coverage of the conditional cash transfer payments have expanded, and that without them, Latin America would be far more unequal than the OECD nations. When accounting for CCTs, Latin America is only slightly more equal than OECD countries. Without them, they are far worse, demonstrating the important nature that CCTs have on reducing income inequality in Latin America. Reformed tax programs could reduce income inequality even further. Pierrri concludes by arguing for continued support of stable policies, that emphasize competitive inclusion, much like the previous mentioned papers, whom emphasize education and democracy as inclusive steps to a more equal society. (Pierrri 2012) The of others have empirically shown that conditional cash transfers contribute to significant reductions of the Gini coefficient in the pre-boom era, though they are maximally effective when the income inequality-increasing bias of social security systems are reduced (Soares et al. 2007).

C. Scholars that believe Increased Commodity Prices have a Negative Effect on Inequality

How Commodity Price Volatility Impedes Poverty Reduction, and What to do About it. Is a report that argues that commodity price volatility is harmful unless several macroeconomic policy adjustments are made to curb dependence, especially in the poorest rural regions of poorer countries, and improve stability. Such policy recommendations include national revenue

management, which has long been practiced by Chile. The paper states that the poorest commodity producers are hurt the most, since their tax systems are typically very dependent on tariff and export revenues. States also typically assume that booms will last forever, and thus rely on its revenue assuming the boom will never end, shortsightedly. (Brown, Crawford, and Gibson 2008)

International Commodity Prices and Inequality in Indonesia is a study of the commodity boom and its effects on Indonesia. It finds that commodities and their increased prices had a negative impact on Indonesian inequality overall. The key finding, however, which connects with the finding of Salas, is that increases in the world prices of mining and oil commodities increase income inequality, while the increase in prices of main Indonesian export crops has a poverty alleviating effect in rural regions of the country (Yusuf 2013). It is important to note that Indonesia is a low-income, relatively undemocratic exclusive society.

Overall, there are some disagreements in the literature regarding the overall effect of commodity prices on income inequality more globally and in Latin America. Some studies discount their effects entirely, while others find important relationships, either positive or negative. Some believe that falling Gini coefficients are the result of conditional cash transfer payments and liberalizing, newly democratic societies, as well as steps made to engage in increasing access to education.

VI. Theory

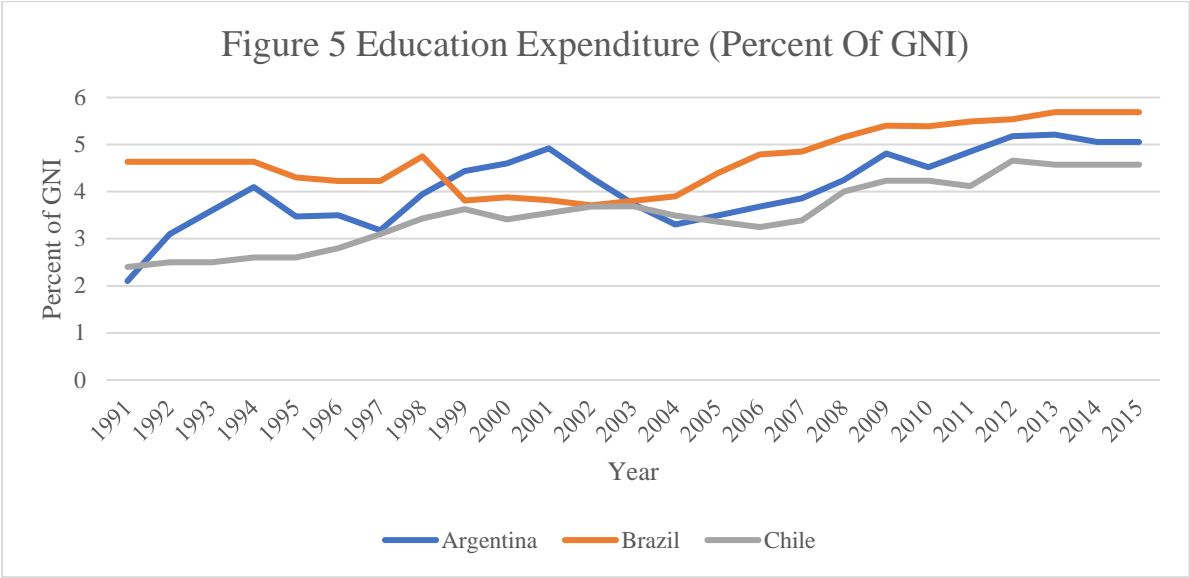
The empirical section of this paper will examine how price-based institutional incentives to produce and new opportunities affected income inequality during the commodity boom. First, I hypothesize that there is an inverse relationship between the price of each commodity and the Gini coefficient. Second, in line with the work of other scholars, I hypothesize that an increase in education spending, and a subsequent increase in education quality will have a negative relationship with income inequality. Third, I hypothesize that increases in tax revenue as a percentage of GDP will have an inverse relationship with income inequality.

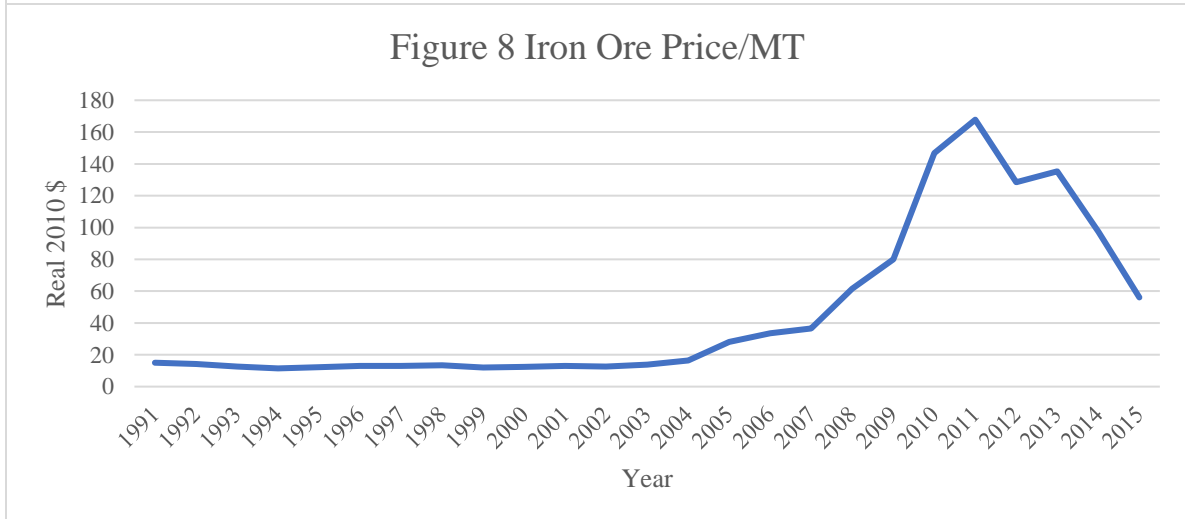
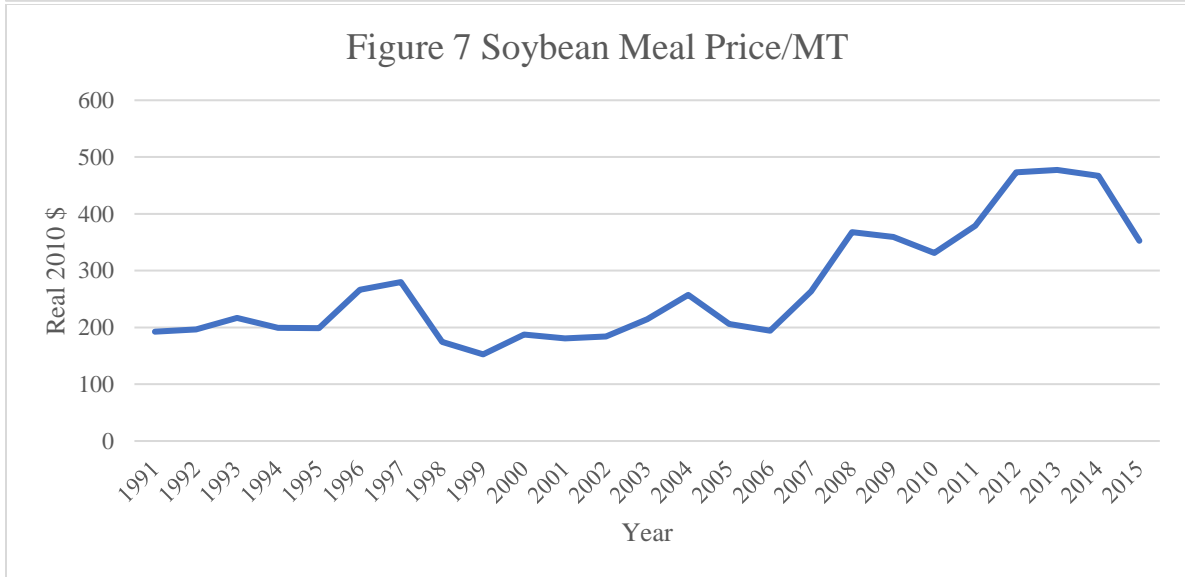
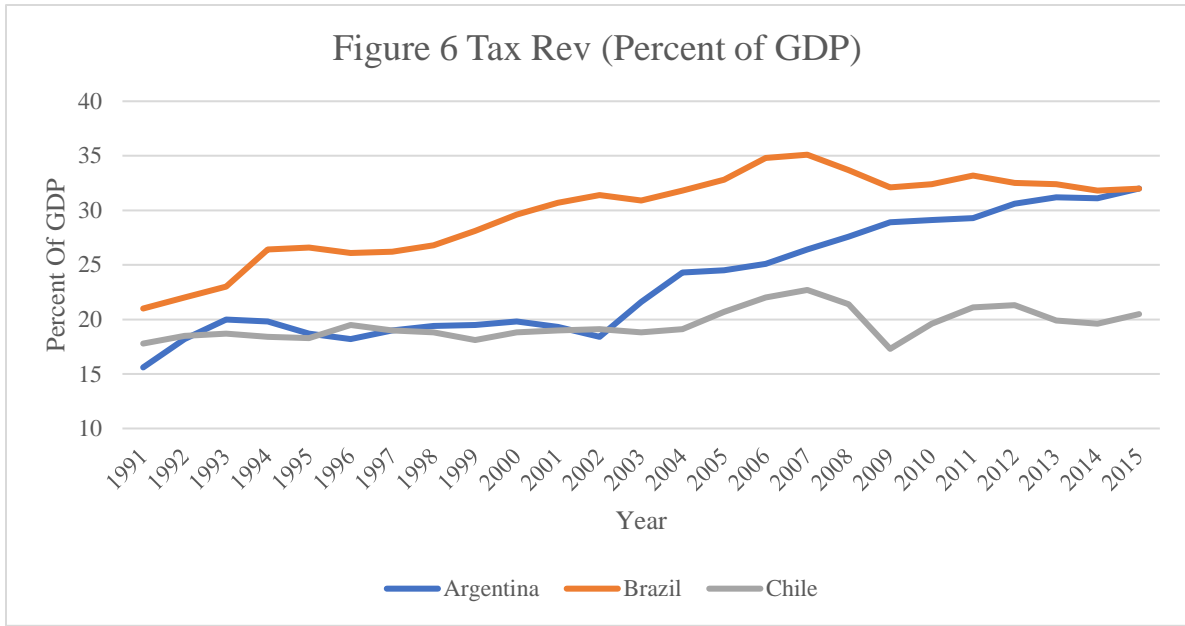
Brazil, Argentina, and Chile, South America's first, second, and fourth largest economies respectively, are significantly affected by commodity prices (Armendariz and Felipe 2017). As such, periods commodity price cycles have affected economic growth. The economies of these countries were, and to some degree remain, based on the production of commodities. Historic relations between owner and laborer resembled that of a master and a slave, due to the requirements of large amounts of unskilled labor and land, both of which were abundant in the new world, especially Brazil (Sokoloff and Engermann 2000). Such trends were broken, and all three countries developed middle classes, albeit Argentina's developed faster than the others. By the 1990s, all three states were nascent democracies striving to create more inclusive societies, but they remained plagued with inequality and instability. Chile remained the most stable of the three through the period. Even with the Argentine default crisis of 2001, Brazil was far more unequal, prone to hyperinflation and poorer than either Argentina or Chile. Argentina and Chile's status of backwater regions of the Spanish Empire set them down a path of institutional development that diverged from Brazil, a crown jewel in the Portuguese Empire.

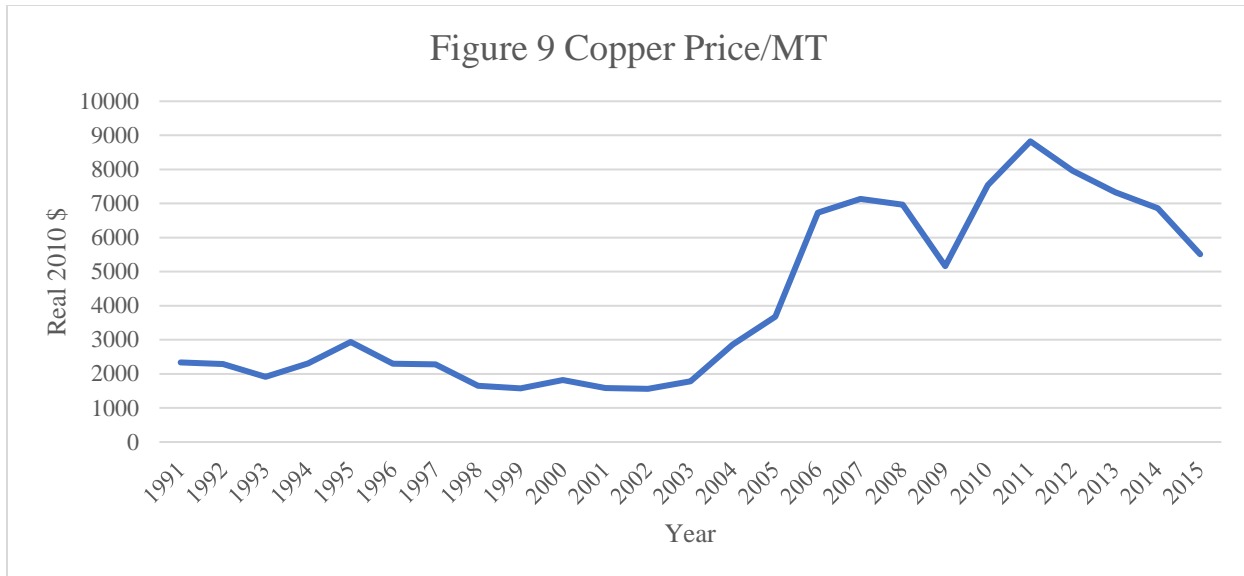
Beginning in 2002, the prices of commodities increased until the price collapse in the early 2010s. Latin America saw drastic reductions in income inequality, while most of the rest of the world saw increases in income inequality, and rapid economic growth. This paper argues that the

price of iron ore, soybean meal, and copper is inversely related with the Gini coefficients of Brazil, Argentina, and Chile respectively. Increases in the price of iron and soybean meal led to an expansion of social services and cash transfer payments that guaranteed minimum standards of healthcare and income to the poorest of the citizenry, and since expansions in the late 2000s, they provide coverage for virtually the entire indigent population (Pierri 2012, Guido Neidhöfer and Miguel Niño-Zarazúa 2017) (For visuals of price changes in each commodity see Figures 7, 8, and 9). Increased revenue at the federal level from profits made from the export of commodities provided funding for these programs, especially after the collapse of Argentina's economy in 2001. Figure 6 shows the change in tax revenues as a percentage of GDP. Neoliberal after Pinochet, Chile has the lowest levels and shows the least change, though growth does occur in the pre-2009 years of the boom. In Brazil and Argentina, the latter of which has struggled to collect taxes for decades, growth in tax revenues were much more robust and reached high levels by 2015. The boom in commodity prices after 2002 led to an increase in funding for education in all three countries. Figure 5 shows the change of education expenditure over time in each country. Growth in spending is apparent in all three countries, with Argentina's changes being noteworthy due to the crisis at the turn of the millennium. This may skew results in education in the model towards a negative relationship. Increased education spending created a more skilled and employable workforce, leading to reductions in unemployment rates and increases in income, as well as having a negative effect on Gini coefficients during the boom years when compared to the pre-boom 1990s. Increased revenue from commodity extraction and export, as well as the increased demand for labor it created, generated opportunity for Argentina and Brazil to expand their social welfare programs, including health and conditional cash transfer payments, and improve mandated public education, all which act in conjunction to increase GDP per capita over time and decrease income inequality. Tax revenue as a percentage of GDP increased throughout the commodity boom, providing governments with significant revenues to provide education and other social services. Some of the literature claims that commodity price volatility increases the Gini coefficient and worsens income inequality (Brown, Gibson, and Crawford 2008). However, I theorize that Argentina, Brazil, and Chile will enjoy reduced income inequality as a result of rising commodity prices because, as nascent democracies and middle-income countries with growing middle classes, their institutional frameworks are more developed than those of low-income, authoritarian countries, whose exclusive, virtually slave-master labor conditions, may exacerbate income inequality during swings in commodity prices. The environment changed in a manner that institutions governing general welfare changed as well. Price-based incentives towards productive institutions aligned with increased taxing power and increased potential revenue from the increase in commodity prices. Latin America has traditionally struggled to collect tax revenues, a significant informal constraint on the choices of political entrepreneurs that has affected their subjective view of society. Taxes as a percentage of GDP have continued to increase post-boom despite low economic growth, a sign that the Southern Cone countries have significantly more power to tax (OECD 2017). Problems remain, but policy solutions during the boom contributed to the increase in taxing power. Argentina now requires that all public employees have a bank account as their wages are directly deposited, allowing the government to track income and tax effectively. Political entrepreneurs could now act on the margins of their constraints, and they did so by securing increased funding for education and providing greater access to social programs for the pay-off of re-election and political relevance. The price of such policies politically decreased thanks to changes in prices in the commodity market that incentivized increased productive activity. The pink socialism of

Lula, the Kirchners, and the center-left Concertación in Chile could engage in such social programs for the pay-off of re-election at a much lower cost politically thanks the influx of cash for the state. Illiberal democratic leaders like the Kirchners and Lula acted on the margins of their constraints because it was in their short-term political profit maximizing interests to do so to help secure re-election, and their actions are likely to give rise to stronger democracies in the medium and long-term.







VII. Research Design

This paper will use six multivariate linear regression models to examine the relationships of interest at the .10 level of significance. The first testable hypothesis, hereafter denoted H_1 , states that there is an inverse relationship between the price of each country's primary commodity and its Gini coefficient. Three multivariate regression models will test H_1 , one for each country of interest. The second testable hypothesis, denoted H_2 , claims that additional investment and subsequent improvements in education contribute to the decrease in income inequality. The third testable hypothesis, H_3 , claims that tax revenue as a percentage of GDP is inversely related with income inequality. H_2 and H_3 will be tested using three multivariate regression models, one for each country of interest. The use of two models for the three countries is necessary due to the presence of multicollinearity in commodity price data and other independent variables. The use of lag for certain variables yields minimally different results due to the use of annualized data. The models cover from 1991 to 2015.

H_1 : The prices of the primary commodities of Argentina, Brazil and Chile, soybean meal, iron ore, and copper respectively, are inversely related with the Gini coefficients of each respective country.

H_2 : Increased investment and improvement in public education in the countries is inversely related with the Gini coefficients of each respective country.

H_3 : Tax revenue as a percentage of gross domestic product is inversely related with Gini coefficients in each country.

Argentina H_1 : $GINI = \beta_0 + \beta_1(PRICE\ OF\ SOYBEAN\ MEAL) + \beta_2(EDUCATION) + \beta_3(UNEMPLOYMENT) + \beta_4(EXPORTS) + \beta_5(FOREIGN\ DIRECT\ INVESTMENT) + e$

Argentina H_2 and H_3 : $GINI = \beta_0 + \beta_1(EDUCATION) + \beta_2(TAX\ REV\ PERCENT\ OF\ GDP) + \beta_3(INFLATION) + \beta_4(EXPORTS) + \beta_5(FOREIGN\ DIRECT\ INVESTMENT) + e$

Inequality in the Southern Cone

Brazil H_1 : $GINI = \beta_0 + \beta_1(PRICE\ OF\ IRON\ ORE) + \beta_2(EDUCATION) + \beta_3(UNEMPLOYMENT) + \beta_4(EXPORTS) + \beta_5(FOREIGN\ DIRECT\ INVESTMENT) + e$

Brazil H_2 and H_3 : $GINI = \beta_0 + \beta_1(EDUCATION) + \beta_2(TAX\ REV\ PERCENT\ OF\ GDP) + \beta_3(INFLATION) + \beta_4(EXPORTS) + \beta_5(FOREIGN\ DIRECT\ INVESTMENT) + e$

Chile H_1 : $GINI = \beta_0 + \beta_1(PRICE\ OF\ COPPER) + \beta_2(EDUCATION) + \beta_3(UNEMPLOYMENT) + \beta_4(EXPORTS) + \beta_5(FOREIGN\ DIRECT\ INVESTMENT) + e$

Chile H_2 and H_3 : $GINI = \beta_0 + \beta_1(EDUCATION) + \beta_2(TAX\ REV\ PERCENT\ OF\ GDP) + \beta_3(INFLATION) + \beta_4(EXPORTS) + \beta_5(FOREIGN\ DIRECT\ INVESTMENT) + e$

Inflation serves as a control variable in each model. Inflation is an important control variable for two reasons. First, both Argentina and Brazil experienced periods of extreme inflation and disinflation. Inflation has also been shown to be positively correlated with income inequality, especially when states with hyperinflation, like Brazil in the early 1990s, see their inflation levels reduce substantially. (Bulir 1998). Inflation in Chile was high in the early 1990s at 21 percent but reduced to steady levels throughout the rest of the period. Inflation is operationalized as a percent change in the price of a set of basket goods over a period of time. Inflation data was acquired from the World Bank's World Development Indicators.

Foreign direct investment serves as another important control variable in all three models. Foreign direct investment is operationalized as a percentage of GDP for the given year. All three countries enjoyed sharp increases in foreign direct investment in the years before the commodity boom. In Argentina and Brazil, foreign direct investment collapsed at the onset of the boom but, increased sharply during the boom in Chile. Neoclassical economic theory emphasizes the importance of foreign direct investment to economic growth, so it is important that the models control for it to measure its general effects on income inequality, whether positive or negative, with those of increased commodity prices. Foreign direct investment data was acquired from the World Bank World Development Indicators database.

Exports, which is to be operationalized as exports as a percentage of GDP, serves as a control variable in the models. Exports as a percentage of GDP generally increased during the years of interest, and it is important to measure their impact on income inequality separate from the price of commodities. Higher commodity prices fail to serve commodity producers if they do not extract and export them to markets. The variable could not be included for the Chilean models, but their exports as a percentage of GDP increased in the boom years to a high of 45 percent in 2007, the highest of the countries of interest, before returning to pre-boom levels that hover around 30 percent, considerably higher than the others. Thus, I assume that Chilean exports were moving to market during the period. Data on exports as a percentage of GDP were acquired from the World Bank's World Development Indicators database.

Education, which serves as a variable of interest for H_2 , is operationalized as the percentage of government spending on public education institutions as a percentage of GNI. This measure allows the model to account for the increase in spending in education in the pre-boom years and the boom years. Increased spending in education has been shown to increase the number of years children spend in secondary education, seeing their careers in secondary education through to completion (Jackson 2017). Improved education can create a more skilled workforce, leading to opportunities for macro level technological advancement and the leveling out of income

inequality to some extent. Data on education was acquired from the World Bank World Development Indicators database.

The price of soybean meal is a variable of interest for Argentina. It is measured and operationalized in real 2010 United States Dollars. These prices account for inflation and provide a clear and steady method of price evaluation. Prices increased in the early 2000s following the commodity boom, and the subsequent increase in economic growth and revenue provided Argentina's nascent democracy with the ability to combat poverty and invest in education systems. The price of iron ore is a variable of interest for Brazil. Like soybean meal, it is measured and operationalized in real 2010 United States Dollars. I choose iron ore and soybean meal because they make up a similar amount of each country's total commodity exports at approximately 30 percent (Adler and Sosa 2011). The price of copper is a variable of interest for Chile. Copper makes up a larger amount of Chile's exports relative to soybean meal and iron ore, but it is the closest and by far Chile's most significant primary commodity. Data on the prices of commodities was acquired from the World Bank's Commodity History and Future Projections database.

Tax revenue as a percentage of GDP is a variable of interest for H_3 . This variable allows for the model to account for the increases in government revenue relative to GDP, measuring the increase in revenue and the state's ability and willingness to levy taxes. Increased tax revenues and taxing power allows for increased government spending to social programs that alleviate income inequality. All three countries engaged in conditional cash transfer programs using tax dollars during the boom years and beyond. This variable measures the impact of increased tax revenue and taxing power on income inequality under the assumption that the state engages in redistributive measures, at least in part, with the additional revenue.

Finally, the dependent variable is income inequality as measured by the Gini coefficient. The coefficient is the result of measuring differences in values of a frequency distribution, most often income. A Gini coefficient of 1.00 indicates that there is maximal difference in income. A coefficient of 100 would indicate that one person accounts for of the income and consumption in a group, and a Gini coefficient of 0.00 would indicate that income and consumption is shared perfectly equally. Gini coefficients declined sharply in the countries of interest, with the most significant declines occurring in the boom period. Gini coefficient data was acquired from the World Bank's World Development Indicators database.

VIII. Findings

Figure 10 shows the results for two linear regression models testing the hypotheses for Argentina using the models elucidated previously. For Argentina's H_1 , the price of soybean meal per metric ton is highly significant with a p-value of .000, indicating a strong relationship between the price and the Gini coefficient. For every \$1 increase in the price of soybean meal, the Gini coefficient falls by .020, indicating a negative relationship. Therefore, the null hypothesis is rejected for Argentina H_1 . The standardized beta coefficient is -.518 the largest change in absolute terms of the independent variables measured. Unemployment is also significant, with a p-value of .000 and an unstandardized beta coefficient of .479 and a standardized beta coefficient of .512. Unemployment's significance is not surprising, as unemployment increased to 19.61 percent during Argentina's highest year of income inequality with a Gini coefficient 53.8. Exports as a percentage of GDP is also significant with a p-value of .003, an unstandardized beta coefficient of .141, and a standardized beta coefficient of .246, indicating a positive relationship. This is

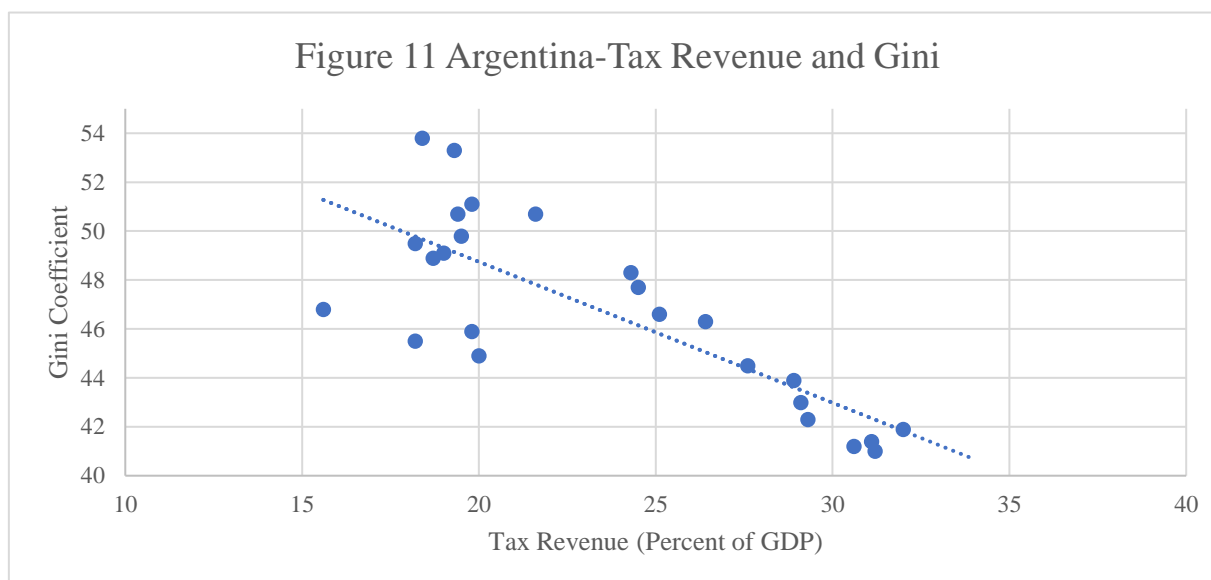
unsurprising as exports increased proportionally to the size of the economy during the 2001 Argentine crisis, when income inequality was highest. In this model, inflation and education expenditures are insignificant and are negatively related to Gini coefficient. The adjusted R-square value is .888 indicating that the model accounts for 88.8 percent of the variance in Gini coefficients in Argentina. The model yields a Durbin-Watson test statistic value of 2.178, indicating minimal negative autocorrelation. Negative serial correlation is indicative of an underestimation of the level of significance of the independent variable.

For Argentina's H_2 and H_3 , education expenditure as a percentage of GNI is significant with a p-value of .077. With an unstandardized beta coefficient of 1.166, every one percent increase in education expenditure results in a decrease of 1.166 in the Gini coefficient. The standardized beta coefficient is .239. Thus, the model rejects the null hypothesis for Argentina's H_2 . The variable of interest for Argentina's H_3 , tax revenue as a percentage of GDP, is highly significant with a p-value of .000, an unstandardized beta coefficient of -.835, and a standardized beta coefficient of -1.130. Thus, the model rejects the null hypothesis for Argentina's H_3 . Figure 11 below displays the negative relationship between tax revenue and income inequality, though not chronologically. Inflation decreases the Gini coefficient slightly, and foreign direct investment as a percentage of GDP marginally increases the Gini coefficient, but neither are significant. In this model, exports as a percentage of GDP is highly significant and has a positive relationship with the Gini coefficient. Argentina's exports as a percentage of GDP increased rapidly during the Argentine Great Depression, as did inequality. With an R-square value .846, this model accounts for approximately 84.6 percent of the variance in Gini coefficients. The model yields a Durbin-Watson test statistic value of 1.570, indicating some positive serial correlation, though, according to a Savin and White table for the sample size and number of regressors, it is not significantly different from 2.

Figure 10: Argentina Linear Regression Models

Gini Coefficient H_1		Gini Coefficient H_2, H_3	
Soybean Meal Price (Real 2010\$/MT)	-0.020***		N/A
(0.004)			
Education Expenditure (Percent of GNI)	-0.359		-1.166 ⁺
(.456)		(0.623)	
Tax Revenue (Percent of GDP)	N/A		-0.835***
		(0.093)	
Inflation	N/A		-0.017
			(0.011)
Unemployment	0.479***		N/A
	(0.084)		
Foreign Direct Investment (Percent of GDP)	-.0039		0.066
(0.189)		(0.222)	
Exports (Percent of GDP)	0.141***		0.349***
(0.041)		(0.052)	
Constant	.46.884***		56.936***
(1.684)		(2.140)	
N	25		25
Adjusted R ²	0.888		0.846
***	= p < .001		
**	= p < .01		
*	= p < .05		
+	= p < .1		

Figure 12 shows the results for two linear regression models testing the hypotheses for Brazil using the models elucidated previously. For Brazil's H_1 , the price of iron ore per metric ton is insignificant with a p-value of 0.612, an unstandardized beta coefficient of -0.006, and a standardized beta coefficient -0.095. Therefore, the study fails to reject the null hypothesis for Brazil H_1 . Education expenditure as a percentage of GNI is significant in the first model with a p-value of .001. The unstandardized beta coefficient is -3.088, indicating that every one percent increase in education expenditure, there is subsequent decrease of -3.295 in the Gini coefficient. Exports as a percentage of GDP is significant with a p-value of .001, an unstandardized beta coefficient of -0.441, and a standardized beta coefficient of -0.399, indicating a negative relationship. Exports as a percentage of GDP decreased as the Brazilian economy began to stabilize in the late 1990s, when income inequality was near its height at 59.9. This is unsurprising as exports decreased proportionally to the size of the economy during Brazil's re-stabilization. In this model, inflation and unemployment are insignificant and are positively related to Gini coefficient. Foreign direct investment as a percentage of GDP is insignificant with a p-value of .279. The adjusted R-square value is 0.791 indicating that the model accounts for 79.1 percent of the variance in Gini coefficients in Brazil. The model yields a Durbin-Watson test statistic value of 1.863, statistically insignificant from 2 in this model.



For Brazil's H_2 education expenditure as a percentage of GNI is significant with a p-value of .000, an unstandardized beta coefficient of -4.220, and a standardized beta coefficient -0.945, the largest of the independent variables. Therefore, the study rejects the null hypothesis for Brazil's H_2 . Figure 13 displays the relationship between education expenditure and Gini coefficients, though not chronologically. Exports as a percentage of GDP is significant with a p-value of .000 and a standardized beta coefficient of -0.614, indicating a negative relationship. Inflation is significant in this model with a p-value of .002 and a standardized beta coefficient of 0.390, indicating a positive relationship. Foreign direct investment is insignificant with a negative effect on income inequality. For Brazil's H_3 tax revenue as a percentage of GDP is significant with a p-value of .004. However, the unstandardized beta coefficient is 0.381, indicating that as tax-to-GDP ratios went up, so too did the Gini coefficient. Thus, the study fails to reject the null hypothesis for Brazil H_3 . Figure 14 shows the relationship between tax revenue as a percentage

of GDP and Gini coefficients, though not chronologically. A possible explanation for this puzzling result is administrative lag. Increases in tax revenue cannot significantly decrease income inequality without allowing time for the deployment of funds. Also, Brazil is the only country whose tax ratio fluctuates, instead of growing steadily. The adjusted R-square value is 0.882 indicating that the model accounts for 88.2 percent of the variance in Gini coefficients in Brazil. This model yields a Durbin-Watson test statistic value of 2.753, indicating slight negative serial correlation, though not statistically significantly different from 2.

Figure 12: Brazil Linear Regression Models

Gini Coefficient H_1		Gini Coefficient H_2, H_3	
Iron Ore Price (Real 2010\$/MT)	(0.011)	-0.006	N/A
Education Expenditure (Percent of GNI)	(0.748)	-3.088**	-4.220*** (0.374)
Tax Revenue (Percent of GDP)		N/A	0.381** (0.115)
Inflation	N/A		0.002*** (0.001)
Unemployment	0.100 (0.202)		N/A
Foreign Direct Investment (Percent of GDP)	(0.244)	-0.272	-0.336 (0.197)
Exports (Percent of GDP)	(0.108)	-0.441**	-0.738*** (0.123)
Constant	75.821*** (4.039)		73.497*** (2.187)
N	25		25
Adjusted R ²	0.791		0.882
*** = p< .001 ** = p< .01 * = p< .05 + = p< .1			

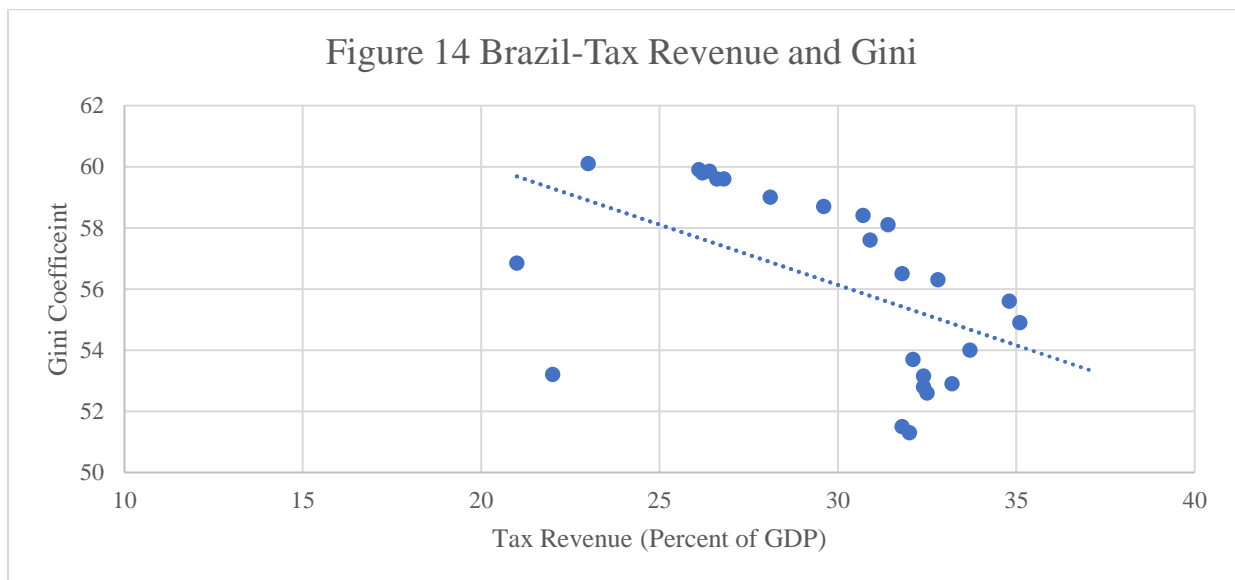
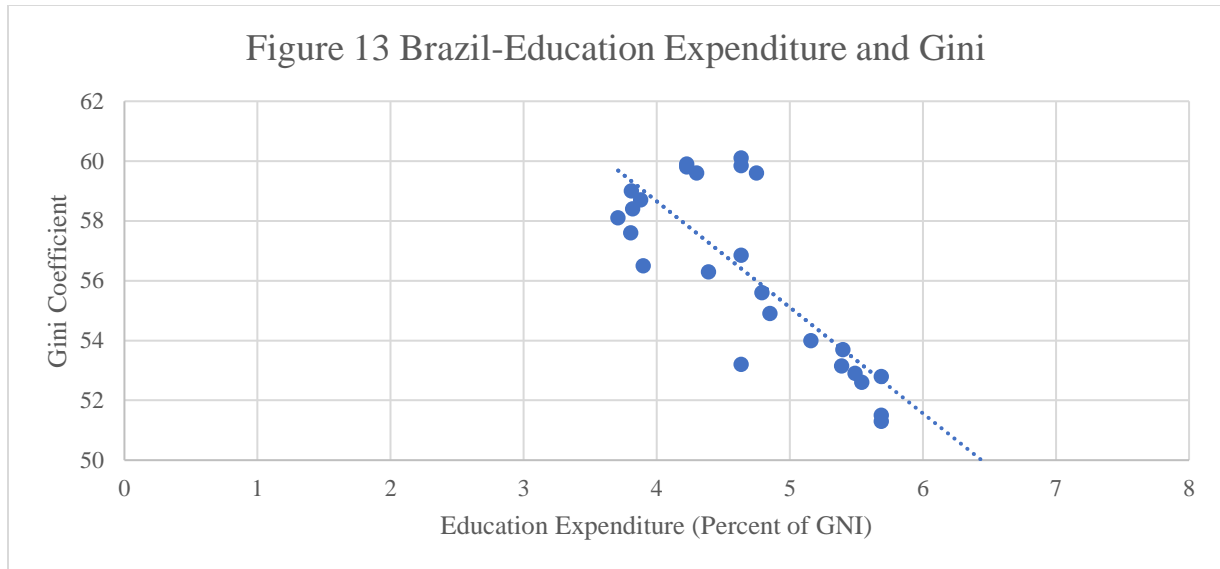


Figure 15 shows the results for two linear regression models testing the hypotheses for Chile using the models elucidated previously. For Chile's H_1 , the price copper is significant with a p-value of .013. For every \$100 increase in the price of copper, the Gini coefficient falls by 0.01, indicating a negative relationship. The range of the price of copper in the data is \$7,263, thus it is unsurprising that the unstandardized beta coefficient is low. Therefore, the null hypothesis is rejected for Chile H_1 . The standardized beta coefficient is -0.381 the second largest change in absolute terms of the independent variables measured. Unemployment is insignificant, with a p-value of .178 and an unstandardized beta coefficient of -0.265 and a standardized beta coefficient of -0.128. Unemployment is negatively related to Gini coefficient in Chile, and this is likely due to Chile's relatively stable unemployment rate, which did experience some meaningful increases in periods that inequality was falling. Education expenditure as a percentage of GNI is significant with a p-value of .000 and an unstandardized beta coefficient of -2.534. Education expenditure has the highest aggregate effect with a standardized beta coefficient of -0.538. This

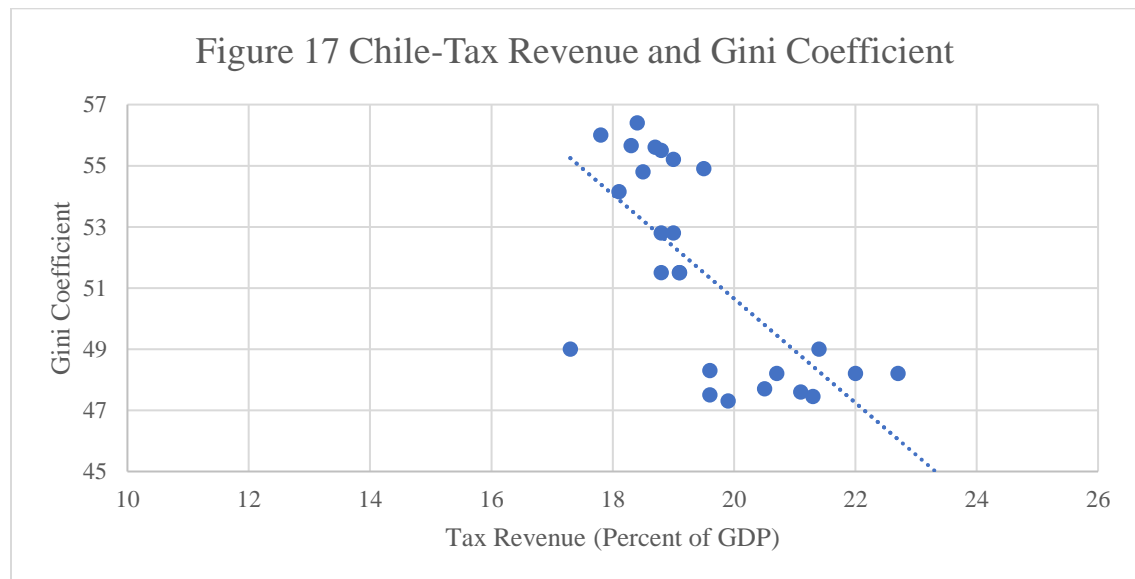
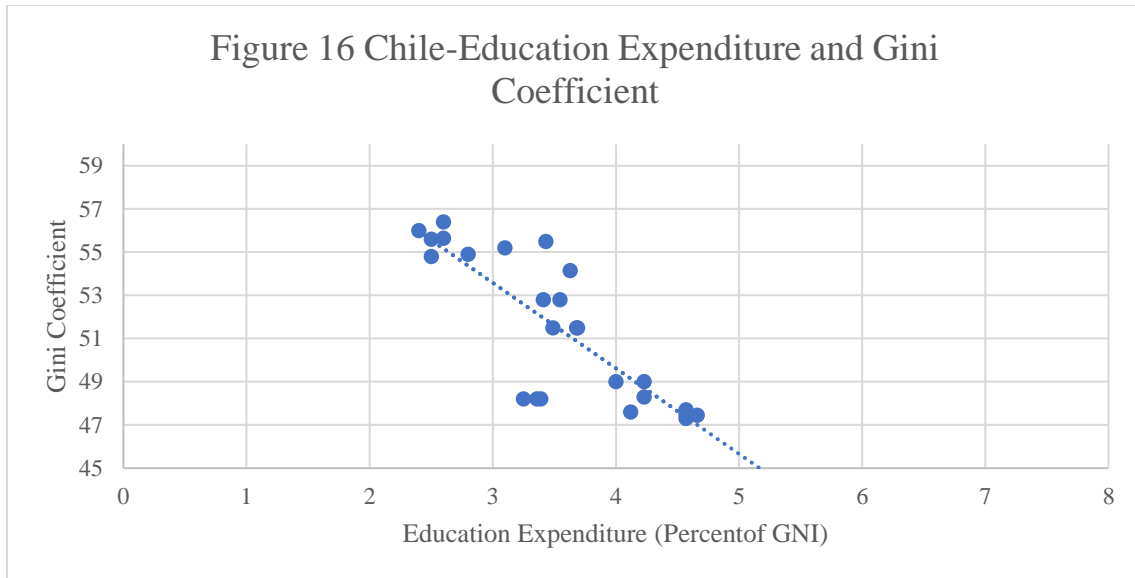
is an unsurprising result, as Chile's education system has different outcomes for the private and public-school systems. Foreign direct investment as a percentage of GDP is significant with a p-value of .092 and unstandardized beta coefficient of 0.213, indicating a positive relationship. An interesting result, considering foreign direct investment is typically emphasized as an important spur to development in development models. Exports as a percentage of GDP is significant with a p-value of .011, an unstandardized beta coefficient of -0.167, and a standardized beta coefficient of -0.285. The adjusted R-square value is 0.929 indicating that the model accounts for 92.9 percent of the variance in Gini coefficients in Chile. The model yields a Durbin-Watson test value of 0.954, indicating potentially serious positive autocorrelation. I speculate that this is due to Chile's Gini coefficient remaining relatively stable over several years before changing significantly.

For Chile's H_2 , education expenditure as a percentage of GNI is significant with a p-value of .000, an unstandardized beta coefficient of -3.180, and a standardized beta coefficient -0.675, the largest of the independent variables. Therefore, the study rejects the null hypothesis for Chile's H_2 . Figure 16 demonstrates the relationship between education expenditure and Gini coefficients, though not chronologically. Inflation is insignificant in this model with a p-value of .652 and a standardized beta coefficient of -0.064, indicating a negative relationship. For Chile's H_3 , tax revenue as a percentage of GDP is significant with a p-value of .012. The unstandardized beta coefficient is -0.519, indicating that for every increase of one percent, there is a decrease of one in the Gini coefficient, and the standardized beta coefficient is -0.212, the third highest of the independent variables in the model. Exports as a percentage of GDP is significant with a p-value of .000. The unstandardized beta coefficient is -0.216 indicating a negative relationship. As the price of copper increased, exports increased, and income inequality fell. The study rejects the null hypothesis for Chile's H_3 . Figure 17 displays the negative relationship between tax revenue as a percentage of GDP and Gini coefficients, though not chronologically. The adjusted R-square value is 0.929 indicating that the model accounts for 92.9 percent of the variance in Gini coefficients in Chile. This model yields a Durbin-Watson test value of 1.738, indicating slight positive serial correlation, though not statistically significantly different from 2 in a model with this sample size and number of regressors.

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Figure 15: Chile Linear Regression Models

Gini Coefficient H_1		Gini Coefficient H_2, H_3	
Copper Price	-.001*** (.000)		N/A
Education Expenditure (Percent of GNI)		-2.534*** (0.506)	-3.180*** (0.489)
Tax Revenue (Percent of GDP)		N/A	-0.519* (0.187)
Inflation	N/A		0.039 (0.052)
Unemployment	-0.265 (0.190)		N/A
Foreign Direct Investment (Percent of GDP)		0.213+ (0.120)	0.182 (0.112)
Exports as a Percentage of GDP		-0.167* (0.059)	-0.216*** (0.045)
Constant	68.596*** (1.726)		90.398*** (5.591)
N	25		25
Adjusted R ²	0.929		0.929
***	= p < .001		
**	= p < .01		
*	= p < .05		
+	= p < .1		



IX. Conclusion

New revenues derived from productive activities spurred by the price increases of commodities, coupled with increased taxing power allowed political entrepreneurs to marginally change the informal rules of welfare policymaking. Political entrepreneurs acted on the change in price of enacting such policies with re-election and maintained political support as the incentives. Fiscal and institutional constraints to the implementation of a robust welfare state that existed due to lack of bargaining power for marginalized classes, and disincentives in the elite classes were swept aside by the pink socialists in Argentina and Brazil. The resulting decrease in income inequality in democratic and stable Chile was significant, and Chile's staunch norms regarding fiscal conservatism and strong institutional framework allowed for relative stability in Chile in the aftermath of the boom and the slowing of economic growth in the post-boom era. Reductions in chronic income inequality diffuse bargaining power across society and increases quality of life

for the most economically disenfranchised members of society. The diffusion of bargaining power and increases in education can lead to an expansion of democracy and the achievement of stability through a complex hierarchy of formal and informal institutions that reduce transaction costs to exchanges and is relatively efficient in the long-term. As income and rights are diffused, the new players in the system can incrementally change the norms and constraints governing production and power. Elites disseminate their privileges into impersonal rights when it is in their political, economic, or physical interest to do so. Lula and the Kirchners expanded social programs and disseminated economic opportunity on the poorer classes of their societies. Argentina and Brazil have struggled in the wake of the boom due to immaturity of institutions and mismanaged macroeconomic policy. They remain Northian natural states with some key challenges ahead. First, neither country was adequately prepared for the commodity bust that occurred in 2014 in terms of managing their revenue flows, dooming the pink socialist movement in the short-term. Government spending did not taper off with the slowdown of growth, and inflation began increasing in both Brazil and Argentina in 2015. Brazil's political system devolved into relative chaos with the impeachment of Dilma Rousseff, the associated corruption scandal and the election of Jair Bolsonaro in 2018. Bolsonaro represents a clear threat to democratic institutions in Brazil, threatening to use the military to govern. Argentina faces no such threats, yet challenges remain to Argentina's political institutions. Argentina and Brazil are both mature natural states. Challenges to their political and economic development include persistent rule by decree, lack of respect for separation of powers, lack of an impartial justice system, corruption, and insecure property rights. Argentina's international property rights index score is 5.025, among the bottom 50 percent of the 20 Latin American countries assessed (International Property Rights Index 2018). Brazil's property rights index score is 5.746, the sixth highest in Latin America (International Property Rights Index 2018). North et al. explain that natural states can hope to become open-access orders when they establish rule of law for elites, lasting public and private organizations and civilian control of the military (North et al. 2009). Argentina has succeeded in controlling its military, though equal rule of law for elites remains a challenge. Despite numerous corruption charges and an indictment, Cristina Kirchner remains a senator in the Argentine Congress, with immunity from arrest and expectations that she will run for president in 2019. In Brazil, all prerequisites remain partially unfulfilled. Brazil's military poses a threat to democracy, especially under Bolsonaro, but Operação Lava Jato demonstrates the potential of the independent judiciary in its prosecution of corruption, partially thanks to a merit-based selection system for judicial appointments and greater autonomy for the Federal Public Ministry and Federal Police (Lorenzon 2017).

Chile has become an open-access order like those of the developed world, though challenges remain. Chile is markedly less corrupt than the peer countries in this study (Transparency International 2018). Chile is free from the threat of military rule and has strong and lasting organizations in its civil society and private sector. However, Chile's education system remains notably unequal, with expensive private schools outpacing their public counterparts (Sapelli and Vial 2002). The informal economy comprises 30 percent of the country's workforce and remains a significant impediment to inclusive growth (Launch of the 2018 Economic Survey of Chile OECD 2018). Aspects of Chile's 1988 Constitution, still in effect, cause problems for Chile's judicial system, and remain the greatest threat to Chilean democracy.

All three countries face challenges in reducing income inequality and positively changing their institutions to encourage productive activity and exchange. To start, tackling institutional issues

can start by mandating transparency across government, including in state-run firms, and contracts between the state and private organizations. Creating politically insulated bodies responsible for independent oversight and administrative tasks increases the costs of corruption (Collier and Gunning 1999; Weinthal and Luong 2006). The state should maintain conditional cash transfer programs, expand them responsibly, and continually assess the results. States should continue to support their public education systems to limit the downward pressure that expensive and exclusive private schools can put on income inequality. Each country can also learn from its counterparts. Argentina and Brazil could learn from Chile's robust copper revenue management system, in which Chile ensures the state does not become too reliant on income from a specific commodity or group of commodities by taxing it at a fixed price below the market price. Fiscal responsibility has helped maintain Chilean stability, but imperfect institutions in Argentina and Brazil can make the cost of such a policy too high, and thus policymakers are constrained. Argentina's tax-to-GDP ratio is now the highest in the region, in some part thanks to the country's efforts to bring lower income people and government workers into the financial system through direct deposit payments. The informal economy in Brazil makes up approximately 16 percent of GDP, according to the previous Minister of Justice, and 30 percent of the labor force in Chile (OECD 2018). Chile and Brazil should do more to incorporate the poorest into the system. Conditional cash transfers can send benefits through bank accounts set up with the cooperation of the government. Brazil remains marred by corruption, but its efforts at strengthening its judicial system and safeguarding its independence are noteworthy, and Chile and Argentina should consider similar reforms.

It is important to note the relative successes and failures of each country and how they relate to their institutional structures. Chile, by far the most stable of the three, has suffered the least from the end of the commodity boom, and this looks to become even more apparent as Argentina's macroeconomic trajectory continues in an unsure direction. Chilean political entrepreneurs had the least incentive to operate on the margins of their constraints due to the rigidly neoliberal aspect of Chilean politics and society. Chile is an OAO already, and as such it is poised to remain relatively stable in the immediate future. However, the constraints of such stability prevent, or at least seriously disincentivize, the relatively radical redistribution policies of pink socialism. Chile saw a less rapid decrease in income inequality, especially after Argentina and Brazil's pivot to pink socialism in the early-2000s. Such stability and strong institutions have spared Chile from the disfunction seen in Argentina and Brazil. Argentina and Brazil saw actors operate on the margins of their constraints in the pursuit of pink socialist policies that actively sought to redistribute wealth. Their populism resulted in reduced income inequality, but also to increased instability towards the boom's inevitable end. Development outcomes in each country is at least in part due to their institutional structures.

Economic dependence on commodities is not likely to end in the Southern Cone in the coming years. However, states can more effectively manage the commodity price cycle to maximize the benefits of the boom and mitigate the effects of the subsequent crash. As energy markets shift, the demand for lithium-ion batteries is likely to increase. Chile and Argentina lie on some of the largest lithium salt flats in the world, and their management of their lithium resources are another potential avenue of wealth and political development.

The study set out to explore the causes of the decrease in income inequality in Argentina, Brazil, and Chile as measured by the Gini coefficient from 1991 to 2015, incorporating Northian institutional economics into the analysis. It opens the investigation into how specific commodity

prices can affect income inequality in specific countries. The research design included six multivariate regressions to test three hypotheses for each country. The models for Argentina and Chile rejected the null hypothesis for H_1 , while the model for Brazil failed to reject the null hypothesis. Brazil's commodity exports are diverse, and perhaps an index combining all of Brazil's commodity exports would yield different results. However, there is evidence that the price of commodities and their subsequent exploitation yielded reductions in income inequality in Chile and Argentina. For H_2 , all three models rejected the null hypothesis, showing a negative relationship between education expenditures and income inequality. For H_3 , the model for Argentina and Chile rejected the null hypothesis, showing a negative relationship between tax revenue as a percentage of GDP and the Gini coefficient. For Brazil, no significant relationship exists. Brazilian revenues remained somewhat steady, especially relative to revenue growth in Argentina. However, increases in tax revenues alone are likely not sufficient to reduce income inequality, but the revenues provided increase the opportunity for programs that can reduce income inequality effectively, like conditional cash transfers and education spending. Each of the studied countries have robust conditional cash transfer programs that mandate vaccination and education for children as conditions to receive benefits. Shortcomings of this analysis include a lack of specific conditional cash transfer payment data, which would have been helpful in building a model to show any potential relationship with increased commodity prices. Limited data in the post-boom years may temper the results, as income inequality, and potential remedies seem to suffer from lag and require study over significant periods of time. The models also struggle to manage the exceptional periods represented in the data, such as the hyperinflationary period of the early 1990s for Brazil and the financial collapse of Argentina in the early 2000s. Potential model improvements could compensate for such exceptional years. Previous models have not examined the effects of specific commodity price changes on inequality, nor have they looked at specific countries, instead preferring cross-country regression analyses. Additional research could show that riding the wave of commodity price increases responsibly can provide revenue increases that allows for the expansion of social welfare programs, investments in human capital and development of productive political and economic institutions. Further inquiry could conduct research on the effect of value-added taxes on income inequality, as Chile implements extensive VATs. Such a development model could be employed by middle income democracies embarking to become wealthier, more stable, and equitable societies. Overall, despite significant challenges ahead, there is reason for optimism for development in Latin America.

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