SCHOOL OF
ECONOMICS AND
MANAGEMENT

Master's Programme in Economic Growth, Population, and Development (Development Track)

Inequality, Poverty, and Economic Shrinking:

A Study of Developing Countries, 1974-2006

by

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Abstract: Recent research suggests that it is the decline in the frequency of 'shrinking' episodes, and not higher growth rates, that are more important for long-term development. A growing body of literature also focuses on how income inequality and poverty affect economic growth rates, with a consensus emerging about their negative impacts. By employing a framework centred around *social capabilities*, this study investigates the effects of income inequality and poverty on economic shrinking frequency, as opposed to previous literature that has exclusively had a growth focus. For such, this study builds a longitudinal dataset including 21 developing countries throughout a 33-year period to demonstrate that while income inequality does not appear to be correlated with economic shrinking frequency, poverty is highly correlated with it. This thesis concludes with the observation that fighting poverty could be of greater importance for economies trying to build resilience to economic shrinking episodes, thus potentially vital for long-term development to take place.

Keywords: Economic Development, Income Inequality, Poverty, Shrinking, Volatility, Social Capabilities, Resilience

EKHS21
Master's Thesis, first year (15 credits ECTS)
June 2021
Supervisor: Igor Baccin Martins
Examiner: Håkan Lobell
Word Count: 15,272

Acknowledgements

First and foremost, I would like to sincerely thank my supervisor Igor Baccin Martins for all his help and support. His knowledge and assistance with the topic, structure, and empirical advice were impeccable. Without him this thesis would undoubtedly be of a lower standard. Next, I would like to thank my classmates for the high standard they continue to set. They constantly impress and push me to learn and achieve further. Finally, I would like to thank Martin Andersson for sparking my interest in the economic shrinking topic.

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List of Abbreviations

CBI	Central Bank Independence
CSP	Centre for Systemic Peace
GCIP	Global Consumption and Income Project
GDP	Gross Domestic Product
GGDC	Groningen Growth and Development Centre
ILO	International Labour Organization
IMF	International Monetary Fund
LIS	Luxemburg Income Study
MEPV	Major Episodes of Political Violence
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PWT	Penn World Table
SIPRI	Stockholm International Peace Research Institute
SWIID	Standardized World Income Inequality Database
VA	Value-Added
VIF	Variance Inflation Factor

1 Introduction

Income inequality within countries and absolute poverty are increasing in many places globally, with 60% of the global population still below the $4.16 (PPP) per day poverty line (Jayadev, Lahoti & Reddy, 2015). In recent years, these visceral topics have become of greater importance in the discourse, with rising inequality thought to be fuelling growing societal dissatisfaction and destabilising democracies (United Nations, 2020). Such trends put the long-term outlooks of countries at considerable risk, threatening and limiting prosperity and progress. Developing countries are also often at greater risk as their institutional environments usually display increased fragilities compared to developed countries. In this regard, understanding how income inequality and poverty play a role in the long-term economic development of developing countries are important topics of research and offer greater insights for 'catching-up' to developed economies.

It has been theorised that income inequality and poverty are good for economic development in some instances by incentivising people to maximise their productivity to increase their incomes. However, these topics are increasingly being shown to hinder economic growth through various channels. For example, lower educational outcomes are associated with increased levels of poverty with individuals more likely to suffer from malnutrition to the detriment of their cognitive abilities (Cole & Neumayer, 2006). Education is often considered a key vehicle for the improvement of the income distribution which can therefore result in a 'poverty-trap', in that poverty itself reinforces a cycle that is difficult to break (Ravallion, 2012). Innovation and entrepreneurship are also hampered by higher income inequality and poverty levels, with successful innovators not able to acquire the necessary capital to take ideas forward (Doering, 2016). Understandably, poverty eradication is the number one United Nations Sustainable Development Goal with poor- and middle-class growth dynamics more likely to increase a country's capacity for sustainable growth patterns (Dabla-Norris, Kochhar, Suphaphiphat, Ricka & Tsounta, 2015).

The unsustainable and volatile growth patterns that developing countries face have long been recognised as a major issue to economic development. Developing economies experience greater volatility of growth rates compared to developed economies and these more

unstable environments limit investment willingness (Perry, 2009) and are closely associated with higher income inequality and poverty rates (Gavin & Hausmann, 1998). Recent research has introduced a new concept in this regard, namely economic 'shrinking' (Broadberry & Wallis, 2017). Economic shrinking is when a country's output has decreased, rather than increased, from the preceding period and can be defined as $GDP_{t-1} > GDP_t$. Naturally, economies can shrink both in the frequency of shrinking episodes and the magnitude of shrinking rate. It has been hypothesised however that long-term economic development has been primarily due to economies shrinking less often, with the magnitude of the shrinking rate being more related to how a country can handle short-term shocks (Andersson, 2018). Understanding and exploring the dynamics of how an economy might build resilience to shrinking episodes are exciting new fields of research and can give fresh insight into the development process. Therefore, it is essential that the roles of income inequality and poverty in achieving more sustainable and inclusive development patterns are investigated further. Simply focusing on how to increase growth rates potentially misses the other side of the coin when it comes to the long-term development and prosperity of countries around the world.

1.1 Research Problem and Aim

As economic shrinking is a relatively new concept to economic development, very little research has been advanced on the subject with the vast majority of the literature focused on growth dynamics. This infancy of topic means that, to the best of the author's knowledge, this study represents the first exploration that specifically focuses on income inequality and poverty with respect to economic shrinking. As income inequality and poverty are such widely researched subjects, this study hopes to contribute by investigating the economic shrinking gap in the research and more broadly help to inform on the development process. To this end, this thesis seeks to specifically ask:

- *What is the relationship between income inequality and poverty with respect to the frequency of economic shrinking for developing countries between 1974-2006?*

This period has been selected to keep a consistent international environment from the end of the Bretton Woods system in 1973 to before the start of the 2007 world financial crisis[1].

To aid in the pursuit of answering the research question, three separate income inequality and poverty measures are utilised to help identify any potential relationship. These measures are the Gini Coefficient, Palma Ratio, and $4.16 (PPP) per day Poverty Line Headcount. In using these measures, this research will ask three sub-questions to guide and give a clearer picture of how income inequality and poverty are related to economic shrinking frequency in developing countries[2]:

- *Is the Gini Coefficient correlated with economic shrinking frequency?*
- *Is the Palma Ratio correlated with economic shrinking frequency?*
- *Is poverty correlated with economic shrinking frequency?*

An empirical strategy is utilised in this study using publicly available data alongside an Ordinary Least Squares (OLS) with fixed-effects methodology. This is to establish potential correlation and effectively, and robustly, answer the questions posed. The results are then analysed through a *social capabilities* framework for building resilience to economic shrinking, from Andersson (2018), to address the overarching research topic. The *social capabilities* framework is concerned with five interrelated aspects, namely *inclusion*, structural *transformation*, state *autonomy*, state *accountability*, and *social stability* and conflict resolution.

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[1] This is elaborated on further at the end of the proceeding Background sub-section.

[2] Sample includes: Argentina, Bolivia, Brazil, Chile, Colombia, Ethiopia, Ghana, Indonesia, Kenya, Malaysia, Mexico, Nigeria, Peru, Philippines, Republic of Korea, Senegal, Singapore, South Africa, Thailand, United Republic of Tanzania, and Zambia. See *Appendix A2: Table 8* for list of countries, regions, and reasonings.

1.2 Outline of the Thesis

This sub-section will briefly outline the structure of this thesis. First, this sub-section is followed by a background on income inequality and poverty trends before outlining the historical reasoning for the period under consideration. Section 2 will begin by focusing on the different aspects of inequality and why income inequality is important to consider. The theoretical research around income inequality, poverty, and economic shrinking is then discussed to introduce the reader to the latest concepts, reasoning, and give context behind the expected results. Section 2 concludes by discussing in-depth a *social capabilities* theoretical framework through which the thesis' results shall be interpreted and analysed. Next, section 3 begins by introducing the data measures that have been used to represent the different *social capabilities* aspects. Data sources and value are also discussed before the empirical analysis techniques are outlined in greater depth. The empirical model specifications are explained, followed by robustness, concluding by addressing potential limitations of this study. Section 4 present and discusses the results of the empirical strategy. First the Gini Coefficient is discussed, followed by the Palma Ratio and then finally the $4.16 Poverty Line. Section 4 concludes with a discussion around how the results can relate to the theoretical concepts previous discussed and implications this might have for future development. Finally, Section 5 briefly summarises this thesis' main findings that income inequality doesn't appear to be correlated with economic shrinking frequency. Poverty however is highly correlated with economic shrinking frequency and this thesis concludes by observing that fighting poverty could be of greater importance for economies that are trying to build a resilience to economic shrinking episodes.

1.3 Background

Global relative income inequality between-countries has been declining steadily for the last three decades as Gini Coefficients, the most commonly used measurement to support this claim, have been falling (Gradin, Leibbrandt & Tarp, 2021). This also reflects a trend in GDP per capita convergence across countries, with developing nations tending to grow more rapidly than developed countries. East Asian countries, for example, have had spectacular

success over the recent decades through their often-touted export-orientated policies and approach. Sub-Saharan Africa countries have also shown growth success since 2000 with their own 'African Growth Miracle' and have made progress in reducing high levels of poverty (Gradin, Leibbrandt & Tarp, 2021). Even Latin America, which is often considered the region of the world with the highest income inequalities, has shown declining measures of inequality over the last decades (United Nations, 2020). On this front, the world has seemingly progressed, but within-country income inequalities are a much more complex picture with many measures recording the opposite trend of increasing inequality (Gradin, Leibbrandt & Tarp, 2021). Within-country inequality has rapidly increased in importance to represent nearly half of the global inequality contribution, as opposed to nearly a quarter in 1980 (Jayadev, Lahoti & Reddy, 2015). The East Asia and Pacific region as a whole has had large levels of income inequality, but this is mainly driven by the heterogenous levels of development amongst the countries based there, whilst Latin America and Sub-Saharan Africa countries have seen falling or constant inequality levels (Jayadev, Lahoti & Reddy, 2015). Absolute income inequalities between countries have also been increasing and as such inequality rightly remains top of the international development agenda.

Trends in global poverty, similar to income inequality, have had mixed success and often dependent on the measures used. The World Bank's poverty lines of $1.25 (PPP) per day and $2.50 (PPP) per day are often regarded as benchmarks in measuring poverty. At $1.25 (PPP) per day, the world has seen substantial poverty reduction over the last 40 years with the most dramatic being felt in the East Asia and Pacific region (Jayadev, Lahoti & Reddy, 2015). Poverty reduction in Latin America has also seen success though Sub-Saharan Africa has seen very little decline. However, it is important to note this measure has come under increased criticism for being far too low as it measures the extremes at less than the poverty lines that developing nations would themselves consider (Sharma, 2018, and Roser, 2021). Around 40% of the global population is said to be covered by the $2.50 (PPP) per day poverty line and this increases to 60% for the US Thrifty Food Plan poverty line of $4.16 (PPP) per day (Jayadev, Lahoti & Reddy, 2015). Considering these higher and perhaps more realistic measures of poverty, the world has seen only small reductions in global poverty levels. There has still been progress in East Asian and Latin American countries, particularly since 1990, but by utilising the higher measure of $4.16 (PPP) per day would result in 80% of the Sub-Saharan Africa population below this line (Jayadev, Lahoti & Reddy, 2015). Understanding the consequences of such trends and how they impact development is thus of primary importance with such mechanisms being explored further in the following section.

Before the effects of income inequality and poverty are discussed in more depth, it is necessary to first provide context and reasoning for the period under consideration in this study; 1974-2006. The lower bound to this period has been chosen as this represents the year following the standardly considered dissolution of the Bretton Woods system. Bretton Woods institutions emerged after 1944 and refer to agreed upon codes-of-conduct for a system of fixed exchange rates amongst international nations (Truman, 2017). Igwe (2018) remarks that Bretton Woods institutions impeded balanced economic development for developing countries and the system's demise led to the less systemic international monetary system we have today (Truman, 2017). The Bretton Woods system effectively collapsed in 1973 (Bordo, 1993) so this study begins in 1974 to keep a consistent systemic international environment across the whole period of observation. The upper boundary of this study, 2006, is chosen to be the year before the 2007 financial crisis that began with the US's sub-prime mortgage loan collapse. This collapse caused a financial crisis that spread throughout the world economy between 2007 and 2010 causing global recessions (Fligstein & Habinek, 2011). Whilst this period has been hypothesised to have had important implications on inequality, the exogenous nature of the shock is inconsistent with the *social capabilities* viewpoint that this study takes. Multiple financial crisis have occurred throughout this period but none led to the worldwide financial contagion that engulfed the world economy beginning in 2007.

2 Theory

Inequality is a multi-faceted topic with, including but not limited to inequalities in opportunity based on sex, age, disability, religion, and ethnicity. However, even though global standards of living are not entirely based on monetary aspects, this study has a monetary focus by using income inequality as an outcome proxy. This is to measure access to economic opportunities that populations might face. A monetary focus is used as it provides a tractable measure over time that also allows for comparisons to be made across space and other studies. This study also, to the best of the author's knowledge, represents the first such investigation that focuses on inequality with economic shrinking and, as such, the broader more recognisable trends are first explored. An important topic when discussing economic inequalities also remains to be addressed, namely wealth. Wealth inequalities across the world have been increasing since the 1980s, albeit at different rates (Alvaredo, F., Piketty, T., Saez, E., Chancel, L. & Zucman, G., 2018). Wealth can be an important monetary aspect to consider due to its potential to dampen growth and exacerbate income inequalities. Increased wealth can also increase access to credit by having more collateral which has the potential to radically change the opportunities and risks people might be able to take. These effects of wealth can also be exacerbated through the inter-generational channels; Morck, Stangeland & Yeung (1998) found that countries with a larger percentage of billionaire heirs, compared to self-made billionaires, grow more slowly and are hindered through various institutional channels. However, wealth has traditionally been a difficult aspect to measure, with Piketty (2014) representing a relatively recent landmark study of such trends. This genre of studies on wealth thus tends to be heavily focused on developed nations and have limited data availability so therefore lie beyond the focus of this paper.

2.1 The Role of Income Inequality and Poverty in Economic Development

In 1955, Simon Kuznets first proposed his now famous, and controversial, theory of the inverse-U relationship between income inequality and economic development. Income inequality at low-income levels must necessarily be low, as most people are living close to subsistence levels with any increase in inequality pushing them below this threshold. As an economy grows inequality increases, due to the structural transformation that takes place, with people initially moving into the higher paid industrial sector. As capital accumulates and becomes more evenly spread throughout the population at later stages of development, inequality begins to decrease and the income distribution becomes more equal again (Kuznets, 1955). A range of studies has since been focused on testing the accuracy of the Kuznets hypothesis with some supporting the findings (Barro, 2000, and Banerjee & Duflo, 2003) and other voicing their criticisms (Ravalion, 1995, and Been-Lon, 2003), thus fuelling the controversy. Through such research, these ideas have gradually been replaced with a growing consensus that developing countries with highly unequal societies are hindered in many ways, including limits on economic growth and poverty reduction (Gradin, Leibbrandt & Tarp, 2021).

Whilst this growing consensus is emerging, it is by no means universally accepted with some studies finding that higher levels of income inequality are positively associated with economic growth (Li & Zou, 1998, and Forbes, 2000). Wage inequalities can incentivise individuals to accumulate higher levels of human capital and increase productivity to maximise their incomes. Different income groups also experience different propensities to save with higher income brackets saving more, thus increasing investment (Dynan, Skinner & Zeldes, 2004). On the other hand, it has been noted that higher income bracket individuals have an increased tendency to invest in non-productive assets, such as luxury goods and housing (Stiglitz, 2016). Increased investment in these areas produces little additional benefit to the wider economy and can even lead to the formation of ‘bubbles’ that can have highly disruptive consequences, such as overinflated house prices. Moreover, Alesina & Rodrik’s (1994) indirect political economy model finds that tax redistributions of income from the wealthiest in society towards the middle-class can be growth-enhancing through reduced social unrest and political instability. Subsequent studies have confirmed such results and even identified income inequality as having a stronger negative effect on economic growth for developing countries by

inhibiting effective institutional development (Birdsall, 2006, Easterly, 2006, and Assa, 2012). These studies are also broadly in line with Van Der Wiede & Milanovic (2014) who find higher income inequality to negatively affect the growth of the poor, the bottom 40% of society, but not for the rich, the top 40% of society. This could be fuelled by an implied "social separatism" of the rich from the poor resulting in a lack of interest in public goods' provisions, although it is important to highlight the authors only tentatively propose such a mechanism. The different development stages in which economies find themselves also seem to play a part, with income and human capital inequality being negatively associated with growth for low- and middle-income countries but not higher-income countries (Castello-Climent, 2010).

Poverty is another important aspect of economic development with poverty eradication being the number one United Nations Sustainable Development Goal. Kuznets (1955) originally regarded poverty and growth as two separate phenomena, famously describing economic growth as "the tide that lifts all boats". Economic growth seems certain to be a, if not the vital ingredient in poverty reduction, especially for low-income countries (Skare & Prziklas Druzeta, 2015, and McKnight, 2019). Further research has since built upon Kuznets pioneering insights with the patterns of growth seeming to be an important determinant of poverty alleviation. Bourguignon (2004) first proposed the poverty-growth-inequality triangle and hypothesised that a country's change in absolute poverty can be fully accounted for by its change in income inequality and income growth, see *Appendix A1: Figure 8*. Essentially, levels of income inequality determine the distribution of economic growth. This means that higher inequality would result in reduced poverty reduction as higher income bracket individuals would reap relatively more benefits from such growth compared to the poor. Many countries, for example, have only experienced modest poverty reductions even in the face of strong economic growth with higher initial levels of inequality being a key determinant (Adams, 2004, and Fosu, 2017).

However, the relationship between inequality and poverty, and their effects on economic growth, has been challenged. Ravallion (2012) found that it was higher levels of poverty, as opposed to inequality, that limited economic growth and such levels of poverty can also form a consumption trap, limiting the poverty-reducing aspects of growth in the first instance. Such a potential issue is very important for development as people living in income poverty tend to have poorer levels of health, through channels such as malnutrition, which in turn limits productivity and economic growth (Cole & Neumayer, 2006). Higher levels of income poverty also disadvantage individuals for educational outcomes and can also be influenced by the depth, duration, and timing of the poverty instances (Ferguson, Bovaird &

Mueller, 2007). Education is an important vehicle for improving the income distribution (Tilak, 1989) which lends further credence to the notion that high instances of poverty can be the growth limiting factor for the inequality-poverty relationship. Human capital accumulation has been theorised to be an important part of any development story and as such higher levels of poverty can cause growth rates to be lower than they otherwise would have been (Galor & Moav, 2004). Another potential mechanism in how poverty can limit economic development is through innovation. Squicciarini and Voigtländer (2015) propose that economic growth is achieved through a "knowledge-elite" who are the chief drivers of technological adoption, with general improvements in human capital, such as literacy levels, serving to improve income levels rather than growth. Individuals with lower-income backgrounds are much less likely to become such inventors, for example, leading to lost potential with the innovation-income gap being largely accounted for in childhood human capital accumulation (Bell, Chetty, Jaravel, Petkova & Van Reenen, 2017). Poverty can be a catalyst for entrepreneurial and creative individuals, but these are invariably stifled in later stages of their business developments and cannot sustain novel ideas (Doering, 2016). In this manner, we can also see again how higher levels of poverty can potentially be the trap that limited overall economic growth, perpetuating a vicious cycle.

A complex picture emerges for the relationship between income inequality and economic development, especially when country heterogeneity is taken into consideration. What is clear is the apparent significant negative long-term effects associated with high levels of income inequality and poverty with perhaps the role of poverty being underrepresented in literature. So far, however, this paper has only framed income inequality and poverty against different aspects of economic growth. Next, however, we shall introduce the concept of economic shrinking and how this relatively new concept can offer a different viewpoint to the development process.

2.2 Economic Shrinking as an Alternative Approach to Economic Development

As already discussed, global income inequality has been declining in recent years due to GDP convergence between countries. However, this is a relatively new turn of events with most of the post-Second World War era being defined by economic divergence and catch-

up seldomly observed (Collier, 2007, Rodrik, 2011, and Milanovic, 2016). The convergence hypothesis in growth theory proposes that developing economies tend to grow faster, per capita, than developed economies due to the law of diminishing returns to investment. Developing economies also can adopt existing technologies without the pressures and costs associated with innovation, with the developed nations being at the forefront of the technological frontier. Pritchett (1997), in his now-famous essay "Divergence, big time", noted the disadvantages for developing countries that such 'backwardness' has resulted in. He acknowledges the notable exceptions of some East Asian economies, commonly referred to as the Asian Tigers but highlights how surprisingly few researchers have tried to tackle the economic volatility and negative growth rate phenomenon (Pritchett, 2000). By focusing on causes of growth, a vast majority of literature potentially misses a key understanding of why some countries have experienced catch-up whilst most other developing economies have stalled.

The economic volatility of developing countries has long been considered a major barrier to the development process. Output volatility has been documented to be higher in lesser developed nations and causes fragilities that negatively impact growth rates such as depressed investment, including human capital investments (Perry, 2009). The unstable outlooks of such volatile environments follow close associations with increased poverty and income inequality with causality likely flowing in both directions (Gavin & Hausmann, 1998). The reasons for the increased cyclical nature of output in some developing countries have been diverse but research has mainly focused on lack of export diversification and poor institutional environments, making such economies vulnerable to shocks (Calderon & Yeyati, 2009). Economic volatility also increases the volatility of poverty, which in turn is consistently associated with increased overall poverty rates (Gnangnon, 2021). In this regard, Dabla-Norris, et al. (2015) also show that more sustainable growth patterns are mostly poor and middle-class-driven through several economic and social dynamics. Individuals thrive better in more predictable environments, but growth volatility also affects the ability of the state to plan and implement change. Reducing volatility is therefore very important for creating fiscal space but the different shocks that countries face speak to more tailored solutions, as opposed to a one-size-fits-all way of thinking.

Broadberry & Wallis (2017) investigated economic volatility by examining the long-run economic performance of select European countries. They define a measurement of economic performance to include the instances of growth episodes and growth rates with shrinking episodes and shrink rates. Economic shrinking is when an economy's growth rate is negative as opposed to simply the growth rate being less than the previous year. This is a

distinguishing feature between economic shrinking and growth volatility. The magnitude of shrinking rates relates to the percentage decline of the economy whereas the frequency of shrinking episodes is related to how often the growth rate turns negative over a period of time. Thus, economic shrinking episodes can be formally presented as: $GDP_{t-1} > GDP_t$. Broadberry & Wallis (2017) determined that economic performance was primarily improved by decreases in the magnitude and frequency of 'shrinking' episodes rather than any increases in growth rates. By taking into account the role of shrinking, they also find that increases in economic performance over time are also associated with a general decline in both shrinking frequency and short-term economic growth rates. Broadberry & Wallis (2017) go on to hypothesis institutional change to be the key reason for such shrinking reductions however, as their study extends back to the year 1270, the applicability of such institutional change is of sceptical relevance for modern-day policy implications.

Economic development can thus be thought of in terms of economic performance, with consideration for both the growth and shrinking episodes that economies might face. Undoubtedly, both the magnitude and frequency of shrinking episodes must be considered to capture the full effects of negative shocks on development. Andersson (2018) added his perspective to the argument of Broadberry & Wallis (2017) by analysing the economic performance of a select group of Sub-Saharan Africa, Latin American and Asian countries from 1951-2016. His conclusions confirmed that the success of Asian countries has been primarily driven by their resilience to economic shrinking, as opposed to the often-considered growth rates. The magnitudes of economic growth tend to be universally shared but the magnitudes of shrinking vary greatly, an indication of the different and inherent resilience a country might poses (Andersson, 2018). By simulating Asian country shrink frequency and magnitude rates on the other regions, Andersson also determined that economic performance seems to be impacted by the frequency of shrinking more than the magnitude of shrinking in the long run. In this regard, shrinking frequency is arguably more related to a countries capacity to sustain economic growth rates whilst magnitude can represent a country's ability to handle major shocks (Andersson, 2018). As such, the shrinking frequency can be related more to an economy's domestic capabilities and it is through this lens that Andersson proposes a *social capabilities* approach, discussed further in the following sub-section.

Economic shrinking is thus chiefly concerned with the frequency and magnitude at which economic growth rates might be negative. Economic volatility, on the other hand, is still mainly viewed through a growth lens with much of the literature focused on the variations of growth rates. Shrinking differs from volatility in this regard and represents a novel way of

analysing vulnerabilities. Huang, Fang, Miller & Yeh (2015) find that income inequality is significantly and positively associated with higher economic volatility, but the significance disappears when growth rates are negative. What then is the effect of economic shrinking on income inequality and poverty when investigated exclusively from a shrinking frequency perspective? To the best of the author's knowledge, this study represents the first investigation of any such relationship and the following section shall outline the theoretical framework through which this shall be assessed.

2.3 Theoretical Framework - A Social Capabilities Approach

Returning briefly to the theory of economic convergence; the theoretical 'advantages of backwardness' may be present but the ability for countries to take full advantage of them may not be. Developing Gerschenkron's (1962) classic work further, Abramovitz (1995) introduced his concept of 'social capability' in that an economy's potential to converge is stronger if technologically backward but socially advanced. The premise being that whilst new technology might be there for adoption, the actual process of adoption might be reliant on societal factors that inhibit such developments, for example, low skill levels might make certain technologies too difficult to use en mass. Some structural and institutional environments would thus need to be in place for developing countries to successfully exploit new technologies and move up their respective technological ladders (Abramovitz, 1995). The advantages of such a theory take into greater consideration the multi-dimensional aspects of development that economies might face in their respective journey to catch-up. As such, it is through this framework that Andersson & Palacio (2017) and Andersson (2018) developed a *social capabilities* theory in building resilience to economic shrinking. They present five broad categories that encompass the social and institutional aspects considered important to the development process, these are presented and discussed in detail below.

2.3.1 Inclusion

This aspect of the theoretical framework is arguably the most important to this study. *Inclusion* refers to the access of economic opportunities, and their distribution so that the population at large can broadly participate and reap the benefits of economic activity (Andersson, 2018). Inequality, and how this affects development, has already been discussed quite extensively and as such, this section shall focus on growth patterns. Intuitively, more inclusive societies are better able to not only benefit from economic growth more broadly but also generate growth and become more resilient to shrinking through such mechanisms as better allocation of talent (Hsieh, Hurst, Jones & Klenow, 2019). Pro-poor growth patterns are characterised by falling poverty rates and widespread access to production resources. Such growth patterns have also been hypothesised as being more likely to be sustained (Pritchett & Werker, 2012), with the growth dynamics making it less likely that people would fall back under the poverty line once above it (Dercon & Shapiro, 2007). However, it is also important to remember that inclusion goes further than such narrow considerations. For example, income inequality has been shown to limit formal financial inclusion, relative against an economy's respective level of financial development, but such inequality is driven by a systemic difference in gender inclusion (Aslan, Deléchat, Newiak & Yang, 2017). It is easy to see how a pro-poor growth process would help to build resilience to economic shrinking episodes, but more holistic considerations would also not go amiss in future research.

2.3.2 Transformation

Structural *transformation* of an economy has traditionally been seen as a vital part of any growth process, both economical and social. An agricultural transformation is seen as a key determinant of structural change as this can release labour and capital to higher productivity sectors whilst helping to support sustainable growth patterns (Andersson, 2018). Whilst societal change can be difficult to quantify, structural change on the other hand can be seen as an economy moving from low productive activities to high productive activities and increase its economic complexity (Rodrik, 2014). As already briefly touched upon with economic volatility, export diversification and sophistication are seen as important aspects when it comes to building resilience to shocks, and thus potential economic shrinkages (Andersson, 2018). One consideration that should not be overlooked, however, is that increased employment in

industry and services does not necessarily lead to increased value-added (McMillan, Rodrik & Verduzco-Gallo, 2014). Previous studies have also included value-added with the percentage share of agriculture in their analysis (Palacio, 2018, von Borries, 2019, and Karlsson Schedvin, 2020), however, this study seeks to include Industry and Services, including Gross Value-Added at Constant 2005 National Prices, to better capture differing growth processes. Successful structural transformations are also associated with lower economic growth rates, due to the nature of how value is added in different industries (Dietrich, 2020), which again highlights the importance of such considerations when investigating economic shrinking in development.

2.3.3 Autonomy

The aspect of state *autonomy* is the ability of the central government to keep vested interests in check. Examples of this would be the state's ability to resist potential 'lobbying' activities to create progressive taxation systems or ensure the benefits of market activity are felt more broadly. This capability ensures states are insulated to outside influence and as such are likely to credibly represent a consensual and exemplary government (Andersson, 2018). Previous studies have mainly focused on the state's fiscal capacity in this regard, with inflation often serving as the proxy measure of a state's central bank's independence. The premise being that a state's central bank is chiefly responsible for controlling inflation targets by manipulating interest rates, which may run counter-productive to the ambitions of the central state (Palacio, 2018). In support of such a hypothesis, higher levels of Central Bank Independence (CBI) are associated with lower inflation rates in both developed and developing countries and are associated with more likely growth rates in the long run (Palacio, 2018, and Garriga & Rodriguez, 2020). Autonomy is a difficult aspect to measure as it necessarily involves both de jure and de facto power dimensions which can be complex to quantify. However, it is important to also note that de jure power does not appear in a vacuum and, whilst it cannot fully appreciate the influence of de facto power, de jure power can reflect the complex power relations institutions may face (Garriga & Rodriguez, 2020).

2.3.4 Accountability

The *accountability* capability is the ability of the state to provide quality governance and public goods provisions; in essence, the legitimacy of the governing amongst the governed (Andersson, 2018). Under-taxing and limited fiscal capacities are characteristics of developing economies that add additional importance to the use of such capacities. For example, education and health care measures are often considered excellent proxy measures in considering a state's capacity to provide public goods and the quality of its institutional environment (Palacio, 2018). Education and health measures are also important controls to include not only for state accountability but because of their potential effects on income inequality. The mortality rate of children under 5 years of age can influence the long-term persistence of income inequality and raising provisions in this health field can be an effective way to limit income inequality in developing countries (Sarkar, 2008). Moreover, higher levels of education amongst citizens are associated with reduced levels of income inequality in developing countries (Mughal & Diawara, 2011).

Accountability does not only necessarily encompass what a government should spend its money on, but also what it should not. In this study, military expenditure as a percentage of GDP is considered as higher levels of spending are negatively associated with economic growth and development (Collier, 2006, and Azam, 2020). Military expenditure can be used as a vehicle to support economic growth, but this is dependent on conflict exposure with higher levels of spending having the ability to shorten the length of conflicts (Aziz & Asadullah, 2016). Military spending has recently shown signs of convergence across developed and developing nations but once again these are dependent on neighbour activity and the domestic social and political stability each nation faces (Clements, Gupta & Khamidova, 2020). These considerations indicate the importance of including in this study not only military expenditure but also controlling for episodes of violence in bordering nations.

2.3.5 Social Stability

This leads to the discussion of the final social capability under this theoretical framework, namely *social stability*, and conflict resolution. The ability of countries to peacefully resolve conflict within their respective societies has been seen as a key aspect of the long-term development process. The state plays an integral part by providing such institutions

as law and order which also helps to encourage ‘good’ business environments (Andersson, 2018, and Rodrik, 2000). Should scarce fiscal capacities need to be expended on maintaining social stability, this lowers the potential piece of the pie that other development areas could receive. Whilst conflict can thus inhibit governmental investment in areas such as education and healthcare, it also reduces the willingness to invest more generally which seems to be a common characteristic of growth collapses (Jones & Olken, 2008). Economic development is thus severely hindered by conflict with the possibility of a ‘conflict trap’ also stalling the possibilities of progress (Collier, 2004). The highly destructive nature of conflict is thus an important consideration for any society, but it is also important to note the different mechanisms by which disputes can be settled and the history in which such conflicts may be re-enforced. The need for highly contextualised considerations however does not take away from the clear and intuitive ways in which conflict hinders development in a broad sense.

3 Data and Methodology

3.1 Data

This study uses annual time series data for a total of 21 different countries across 3 distinct geographical regions from 1974-2006. The countries were selected to represent large population sizes to capture the effects covering as wide a range of people as possible, a more detailed list of countries and reasonings can be found in *Appendix A2: Table 8*.

The previously discussed Theoretical Framework sub-section outlines five distinct categories, through a *social capabilities* approach, that are theorised to help build resilience to economic shrinking (Andersson, 2018). These categories are inclusion, transformation, state autonomy, state accountability, and social stability. No ideal measure of these capabilities exists, and *Table 9* in *Appendix A2* briefly summarises the well-known proxy measures this study shall utilise.

3.1.1 Descriptive Statistics

Table 1 below presents the summary descriptive statistics for all the variables used in this study. The mean frequency of economic shrinking for this sample is 0.317 which can be considered as a percentage term, meaning that the combined country shrinking frequency was almost 32% for the period under consideration. A high standard deviation of 0.223 indicates a wide range of variance of this value which we shall see later is generally weighted highest for Sub-Saharan Africa countries and lowest for East Asian countries. This overall pooled measure very crudely suggests that developing countries between 1974-2006 only experienced positive economic growth 2/3rds of the time. The Gini Coefficient maintains a low standard deviation but the Palma Ratio and $4.16 (PPP) per day Poverty Line also experience high standard deviations. Attempts to control 'outlier' countries are explored in the Results section to better help take account of such high variance in these variables and aid analysis. All variables used in this study represent the rolling averages of their respective measures, helping to smooth data

Table 1: Summary Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Economic Shrinking Frequency Ratio	672	.317	.223	0	.895
Gini Coefficient	672	.532	.081	.342	.758
Palma Ratio	672	5.092	3.967	1.378	22.916
$4.16 Poverty Line	672	67.255	26.542	5.63	99.946
GDP per capita (log)	672	8.495	.836	6.586	10.324
Agriculture VA (log)	672	12.13	3.234	4.805	19.312
Agriculture Emp. %	671	48.999	24.076	.747	92.543
Industry VA (log)	672	13.169	3.152	7.244	20.368
Industry Emp. %	671	18.974	10.569	2.002	39.229
Services VA (log)	672	13.233	3.025	7.142	19.782
Services Emp. %	671	31.43	14.473	5.418	64.045
CBI	653	.352	.116	.122	.653
Inflation	649	32.216	47.146	3.02	485.401
Human Capital Ratio	672	1.767	.402	1.022	2.802
Under 5's Mortality Rate	672	106.169	65.463	8.794	256.6
Military Expenditure %GDP	656	3.12	1.537	.483	7.007
Total Domestic Civil MEPV	672	1.376	2.181	0	8.333
Total Border States MEPV	672	1.933	2.603	0	9.6

Note: For summary of data sources see *Appendix A2: Table 9*.

trends. Examples of the crude vs averaged variable measurements can be found in *Appendix A1: Figures 9, 10 and 11*.

3.1.2 Economic Shrinking

Firstly, an understanding of the overall economic performances of our interested countries during the respective period is required. This endeavour involved collecting and analysing a measure of Gross Domestic Product (GDP) and transforming it into a per capita measurement. The Penn World Table 10.0 (PWT) was chosen as the most appropriate measure of economic performance in this respect with data existing across all interested countries and periods (Feenstra, Inklaar & Timmer, 2015). The PWT's measure of real GDP at constant 2017 national prices (USD) is converted using Purchase Power Parity (PPP), ensuring suitability for international comparison, and their Population measure also allows for simple per capita estimations. Per capita estimations are generally used as a more suitable measure for comparing living standards and welfare across countries which is consistent with a *social capabilities* approach and focus on inequality. However, GDP itself can diverge from more comprehensive measures of living standards by excluding non-monetary measures of wellbeing which presents potential limitations to using such a measure (de Jong & Palma, 2018). A multitude of appropriate sources exists for GDP measures, such as the World Bank and the Maddison Project, which also possess observations across all interested countries and periods. These

sources were ruled out, however, as other variables provided by the PWT are also incorporated into the model specifications, helping to ensure as consistent data methodology as possible.

Economic shrinking is considered to be when an economy's rate of growth is negative, as opposed to growth rates simply being less than the previous year. Therefore, to assess economic shrinking the growth rate from the previous yearly observation for each country was calculated. An economic shrinking dummy variable was then introduced as a value of 1, if growth was negative, and 0, if growth was positive. To transform a country's measure of shrinking to a non-binary measurement, a rolling moving average for the shrinking dummy was established per country over the period in question, thus introducing a measure consistent for time-series analysis. This new variable, named here as the Economic Shrinking Frequency Ratio, allows for the exploration of how *social capabilities* are related to the frequency in which an economy's income shrinks as opposed to grows. As the rolling average of equally-weighted yearly observations was taken, the Economic Shrinking Frequency Ratio can be conceptualised as the percentage of shrinking vs non-shrinking years over a given period.

The logarithmic function of GDP per capita will also be used in this study as a means of control for different economy sizes and account for the potentially exponential nature of economic growth across a wide array of countries. This measure is designed to better allow for cross-country comparisons making potential results more meaningful.

3.1.3 Inclusion/Inequality

Inclusion refers to the ability of an economy's population to broadly participate economically and the fruits of such economic activities to be distributed fairly amongst the general population (Andersson, 2018). As this dimension is the chief social capability under investigation, it shall be explored through multiple dependent variable analysis:

- Income standardised Gini Coefficient – The Gini Coefficient is perhaps the most commonly used measure of income inequality. This measures the whole income distribution in an economy and assigns a value between 0 and 1, with 0 representing perfect income equality and 1 perfect income inequality.
- Palma Ratio – This ratio represents the income share of the top 10% of households against the bottom 40% of households in an economy. A benefit of including this measure in the study is that it measures the income distributions tails, in contrast to the Gini which

measures the whole distribution. This will allow for a different perspective to also be investigated with a higher ratio representing more inequality between the income distribution tails.

- Poverty Headcount Ratio $4.16(USD) (2005 PPP) – This measures the headcount ratio of an economy's population that lives below the $4.16 (PPP) per day poverty line. This line is set by the US Thrifty Food Plan as the minimum cost to achieve a nutritious diet in the US. As this measure is by Purchasing Power Parity (PPP) it can be used as an international measure for a food poverty line, see Jayadev, Lahoti & Reddy (2015).

The Global Consumption and Income Project (GCIP) is the source of all inequality proxy measures used in this study (Lahoti, Jayadev & Reddy, 2016). The GCIP provides two datasets with the Gini and Palma data being drawn from the income-based dataset and the poverty data being drawn from the consumption-based dataset. Inequality measures, such as the Gini, are often measured by either income or consumption and these measurement variations are broadly consistent across different regions. For example, most developed and Latin American countries measure the Gini by income whilst most Asian and African countries measure the Gini through consumption. The GCIP uses standardised measures for all interested countries across the entire period under observation. This data source thus offers advantages over other sources, such as the SWIID, the WIID, or Povcalnet, due to its consistency, comparability, and comprehensiveness. However, inequality measures are difficult to collect, especially historically, which potentially points to questionable data quality issues. The GCIP uses statistical extrapolation and interpolation techniques to estimate observations for missing survey years using parametric estimations, a full description can be found in Lahoti, Jayadev & Reddy (2016). This is an important point that offers the need for healthy caution when interpreting results. These computational strategies are similar, though the exact methodologies differ, to other inequality databases openly available, such as the SWIID and LIS. The SWIID for example has also been justified in its use for previous research on this topic (von Borries, 2019, and Schedvin, 2020). There exists, as of yet, no database that can be pointed to as the ‘best’ source of data on inequality with the GCIP aiming to complement the field whilst attempting to be as open and transparent with their computation methods as possible (Ferreira, Lustig & Teles, 2015, and Lahoti, Jayadev & Reddy, 2016).

3.1.4 Transformation

All successfully developed economies seem to have necessarily gone through a process of dynamic and disruptive change, both structurally and societally. The Groningen Growth and Development Centre's (GGDC) 10-Sector database (Timmer, de Vries & de Vries, 2015) offers Gross Value-Added at Constant 2005 National Prices and Employment, Persons Engaged in, data for 10 broad sectors of an economy:

1) Agriculture, hunting, forestry, and fishing;
2) Mining and quarrying;
3) Manufacturing;
4) Electricity, gas, and water supply;
5) Construction;
6) Wholesale and retail trade, hotels and restaurants;
7) Transport, storage, and communication;
8) Finance, insurance, real estate, and business services;
9) Government services;
10) Community, social and personal services.

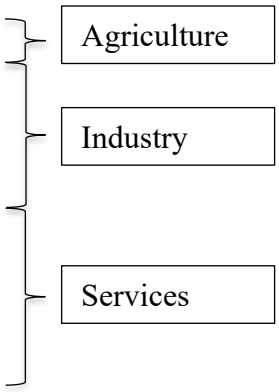

Figure 1: GGDC 10-Sector Database Categories

Government services (9) data is unavailable for a wide array of economies across all three geographic regions under investigation and as such is not included to achieve consistent results. Sector (1) values will be used to represent the Agricultural sector, sectors (2)-(5) will be combined to represent an overall Industry sector, and sectors (6)-(10), except for sector (9), will be combined to represent an overall Services sector, following Timmer, de Vries & de Vries (2014). The logarithmic functions of the value-added data are taken to better compare the differences that such a wide array of countries might face in terms of their respective specialisations. The GGDC offers a comprehensive, reliable, and comparable data source with two main primary sources of data collection coming from the ILO and household surveys, a full description can be found in Timmer, de Vries & de Vries (2014). One point of note, however, is the database does not account for the informal sector, only formal sectors, which may not give an accurate picture of an economy's transformative process and trends. This issue is perhaps more prevalent for Sub-Saharan Africa economies, however with no reliable way to account for such economic environments this is a potential problem inherent in this study and the author notes some caution when interpreting results.

3.1.5 Autonomy

State *autonomy* represents a difficult measure to ascertain and assess. A common measure that has traditionally been used by researchers has been inflation, as it is seen as a proxy measure for the independence of Central Banks against potential state influence (Palacio, 2018, and Andersson, 2018). However, this measure is alone not an entirely appropriate measure of state autonomy but an important variable to consider in an economic shrinking context. As such, Garriga (2016) provides a dataset of CBI indices that shall also be utilised in this study alongside inflation, with the dataset covering all developing countries of interest and respective periods. This CBI index only accounts for de jure relations as de facto relations are difficult to measure, and this is worth keeping in mind when interpreting results. Therefore, it is deemed appropriate for the CBI index to be included alongside inflation, with the inflation figures being taken from the World Bank and measured in annual percentage change (2021a).

3.1.6 Accountability

Accountability is the capacity of the state to provide public goods and as such can be measured by proxy in a multitude of ways. A measure of human capital shall be used from the PWT 10.0 to represent the educational provisions provided by the state. This Human Capital Ratio is based on average rates of schooling from Barro & Lee (2013) and an assumed rate of return, full details can be found in Feenstra, Inklaar, and Timmer (2015). Another measure used is the mortality rate of children under 5 years of age. This measure is taken from the World Bank (2021b) and is measured per 1,000 live births, representing the health aspect of inequality that people might face.

Military expenditure data was acquired from the Stockholm International Peace Research Institute (SIPRI) covering all countries of interest in this study for the vast majority of years (SIPRI, 2020). The SIPRI database does not involve any assumptions or extrapolation with estimates being based on empirical data. Military expenditure data has the potential to be purposefully misreported in national accounts, as a military tactic, and must be something to be aware of when handling such data. SIPRI uses multiple sources to cross-reference military

expenditure data and only introduces their estimations in the presence of significant reason to doubt national accounts[3].

3.1.7 Social Stability

This study shall use instances of political violence as outcome proxy measures to account for the social conflict dimension of the *social capabilities* theory. The Centre for Systemic Peace (CSP) "War List" will be used to account for all instances of Major Episodes of Political Violence (MEPV) across all countries for all periods under investigation (Marshall, 2019). MEPV are defined to involve at least 500 "directly-related" deaths in which the level of intensity has been adjudged to have reached such a degree that the political violence is both sustained and systemic (Marshall, 2019). Episodes are measured on a ten-point scale per year as to the judged intensity of the violence experienced with the scale being additive and a ratio for analytical purposes, full methodological details can be found in Marshall (2019). Whilst these measures do not fully account for all dimensions of conflict resolution they still represent important conflict resolution measures at their extreme, as one would think that societies would exhaust alternative options before resorting to violence. In this manner, this study shall therefore utilise two measures from the MEPV database.

The first is the Total Summed Magnitude Scores of All Societal Violence involving the state within a given countries borders. This measure considers episodes of Civil Violence, Civil Warfare, Ethnic Violence, and Ethnic Warfare. The second measure that will be used is the Total Summed Magnitude Scores of All Interstate and Societal Violence involving the state for all bordering states, normalised for the differing amounts of border states countries might have, see *Appendix A1: Figure 12*. This more total measurement is used as the threats that countries can face can come from both interstate violence and the negative spillovers that might arise from a border country's civil violence (Philips, 2015). This is also an important measure to include when controlling for military expenditure, as border state violence is associated with increased military expenditure in home countries (Philips, 2015).

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[3] A full review of methodology can be found at https://www.sipri.org/databases/milex/sources-and-methods.

3.2 Methodology

An empirical strategy is utilised in this study coupled with visual trend inspections to reflect robust trend analysis. Such trend analysis represents an investigation of correlative measures and cannot be interpreted as causal inference. All formulations were done using the statical software package STATA 16 with a strongly balanced dataset. The inclusion of the different measures of social capabilities, controls, and econometric specifications are expected to bring about robust results that are appropriate for identifying any potential relationship between economic shrinking and inequality.

3.2.1 Model Specification

To explore the relationship between income inequality and poverty with economic shrinking, the Economic Shrinking Frequency Ratio shall act as the dependant variable with explanatory independent variables following. This study ultimately utilises a fixed-effects specification to estimate the relationship of inequality and economic shrinking. However, to arrive at this specification, pooled Ordinary Least Squared (OLS) regressions are necessarily first estimated using a stepwise method. As such, a basic OLS model specification can be written:

$$(1)\ Economic\ Shrinking\ Frequency\ Ratio_{i,t} = \beta_0 + \beta_1 Inclusion_{i,t} + \beta_2 lnGDP_{i,t} + \beta_3 Transformation_{i,t} + \beta_4 Autonomy_{i,t} + \beta_5 Accountability_{i,t} + \beta_6 Social\ Conflict_{i,t} + \mu_i + \theta_t + \varepsilon_{i,t}$$

In this specification, μ and θ denote the time-invariant and time-variant components, respectively, with ε denoting the regression error term. Subscript i denotes individual countries, representing the spatial aspect captured by differing economies. Subscript t denotes the time dimension of the study, measured in years. A method of calculating the cumulative moving averages of the data in question was used. Essentially this strategy is employed to capture the changing trends in the panel data and smooth its effects whilst also eliminate the need for arbitrarily lagging variables. In calculating these rolling moving averages, both arithmetic and geometric means were used were appropriate, see *Appendix A:*

Table 2. Model (1) represents regression numbers 1 through 5 in the Results section, although for a complete specification to be accomplished fixed-effects must be introduced. One problem with the OLS specification (1) is that there is a significant possibility of the independent variables also being correlated with country-specific factors or the error term, which can introduce omitted variable bias. To control for any potentially idiosyncratic confounding factors, a Hausman test was performed to establish the suitability of a fixed- or random-effects model for the final regression. The null hypothesis was rejected, indicating that a fixed-effects model would be more appropriate as a random-effects model would suffer from unobserved heterogeneity. This, along with the moving-average method, has the advantage of smoothing longitudinal data which accounts for any omitted variable bias in the time-invariant component. Another consideration is around year fixed-effects for the final fixed-effects models presented. As discussed, the fixed-effects method eliminates the variance of the country fixed-effects but the time fixed-effects remain. A Wald test was run against including year fixed-effects and the null hypothesis was rejected, indicating that such a control should be included in the final fixed-effects specification models. The model for regression models 6 and 7 of the Results section can thus be specified without the μ time-invariant and θ time-variant components:

$$(2)\ Economic\ Shrinking\ Frequency\ Ratio_{i,t} = \alpha_i + \beta_1 Inclusion_{i,t} + \beta_2 lnGDP_{i,t} + \beta_3 Transformation_{i,t} + \beta_4 Autonomy_{i,t} + \beta_5 Accountability_{i,t} + \beta_6 Social\ Conflict_{i,t} + \varepsilon_{i,t}$$

Here α denotes the intercept concerning the individual countries now present in the fixed-effects model. One potential problem with this specification however is that a fixed-effects methodology can have a 'flattening out' effect on variables that change little over time. The chief variables under investigation, the Gini Coefficient, Palma Ratio, and Poverty Headcount, have been known to exhibit such characteristics. It is for this reason that the stepwise random-effect OLS models are included in the regression output tables to allow for cross-comparisons to be made.

One final model that is of interest is the pooled effect of interacting geographic regional dummies with the main independent variables of interest i.e., *inclusion*. This is to gauge the different effects that each region may experience, whilst holding all other variables constant. This specification follows on from the fixed-effect method of equation (2), including the Hausman test, and can instead be expressed as:

$$(3)\ Economic\ Shrinking\ Frequency\ Ratio_{i,t}$$
$$= \alpha_i + \beta_1\chi_{i,t} + \beta_2 Inclusion_{i,t}\chi_{i,t} + \beta_3 lnGDP_{i,t}$$
$$+ \beta_4 Transformation_{i,t} + \beta_5 Autonomy_{i,t} + \beta_6 Accountability_{i,t}$$
$$+ \beta_7 Social\ Conflict_{i,t} + \varepsilon_{i,t}$$

In this model, χ donates the categorical interaction term for the different geographic regions of the countries under investigation. This model represents the most complete and comprehensive specification used in this study with outputs rendered within *Tables 3, 5* and *7* of the Results section 4. Also important to define here is the interpretation that the regional interactions should be viewed through. The effect of the *inclusion* variable for the geographic regional dummy of interest would then be given by the sum of $\beta_1 + \beta_2$, whilst the effect of the baseline region would be given as β_2 only. This must be remembered when considering region effects of income inequality and poverty in the aforementioned Results section tables. With the general methodological framework under consideration being presented, now attention must turn to model vulnerabilities to ensure robust estimations.

3.2.2 Robustness Checks

Common with panel data in economic studies is the presence of serial autocorrelation and needs to be tested for. Serial autocorrelation is when terms are correlated over time within a panel and thus current observations are influenced by past observations. For example, for GDP to be a value at any given year follows the notion that GDP must have been relatively similar in the years proceeding it. In reality, GDP cannot take on a random value as growth, or shrinking, rates will dictate its value from the preceding year. Other variables of interest in this study can, in principle, also be affected by autocorrelation such as inequality, education, or health measures. Serial autocorrelation, when present, can lead to the overly optimistic significance of regressors due to the standard errors of the estimates being too low. A Lagrange-Multiplier test for serial correlation in panel data was developed by Wooldridge and employed during this study. The null hypothesis of the test was rejected, indicating the presence of serial autocorrelation. This was an expected issue however as one problem with using moving average data across time series is that this can create temporal autocorrelation. As such, serial autocorrelation represents a fragility in the model specification that needs to be addressed for efficient estimations.

Another potential issue that must be tested for is heteroscedasticity. This occurs when the error term distribution is different across the panel data over time. The inconsistent variance in the error term can lead to underestimated standard errors and the coefficients to be inefficient. For the OLS regression models, the Breusch-Pagan and Cook-Weisberg test for heteroskedasticity was performed. Only for model 1 of the Results section was the null hypotheses not rejected. As such, models 2-5 of the Results section were estimated using Huber and White estimators. The Huber-White estimators are more appropriate as they cluster the standard errors around individual groups, in this case countries, to achieve homoscedastic consistent standard errors. These robust standard error estimators also have the added benefit of correcting for autocorrelation amongst these regressions. For the fixed-effects regressions, a modified Wald test for groupwise heteroskedasticity was used to assess the presence of heteroskedasticity. These tests also returned a rejection of the null hypothesis indicating the presence of heteroskedasticity that needs to be corrected.

The final consideration is around cross-sectional dependence, also known as spatial correlation, which occurs when error terms are correlated across various panels. This is a potential issue that is common in macroeconomic panels with relatively long time series i.e., over 20- or 30-year periods (Torres-Reyna, 2007). Hoechle (2007) notes that cross-sectional dependence can enter panels through unobserved but correlated factors, such as social norms and group behaviours, and that if not corrected such characteristics can lead to biased standard errors and thus incorrect statistical significance estimates. The Pesaran test was used to identify any cross-sectional dependence with all fixed-effects models rejecting the null hypothesis of no spatial correlation. To correct this Driscoll & Kraay standard errors were used, as presented in Hoechle (2007). These estimates correct for heteroskedasticity, autocorrelation, and cross-sectional dependence and as such are used in conjuncture with the final fixed effects models employed.

3.2.3 Sub-Questions and Expected Results

As previously mentioned, this study will offer multiple dependant variable analysis to try and assess different measures of inequality. This is an attempt to try and gain a more complete picture of how inequality correlates with economic shrinking. Therefore, three specific sub-questions are formulated below which are designed to help answer the overarching research topic at hand:

- *Is the Gini Coefficient correlated with economic shrinking frequency?*
- *Is the Palma Ratio correlated with economic shrinking frequency?*
- *Is poverty correlated with economic shrinking frequency?*

It is expected that the results of these questions will help to shed light on any potential link that there might be with inequality and economic shrinking. It is also expected that all three of the different measures of inequality will be positively associated with economic shrinking, in that higher instances of inequality are correlated with increased instances of economic shrinking. In the context of the theoretical framework being utilised, it is more generally expected that 'better' *social capabilities* would lead to a higher resilience to economic shrinking. As such, whilst this study is primarily concerned with the inclusion aspect, other measures of social capabilities are important to touch upon and interpret in consideration for the theory in its entirety.

3.2.4 Limitations

First, we must discuss the potential limitations of the methodology employed. Whilst multiple variable regressions were used in this analysis, they cannot possibly capture all the aspects of inequality, and as such interpretation should be necessarily limited. Also, it is impossible to include all the factors that might influence economic shrinking which raises the possibility of omitted variable bias, something that attempts were made to negate as much as possible in the final model specifications. Data quality is also always of concern, particularly when studying developing countries due to poorer infrastructure. As such, the preceding section has attempted to present and discuss data sources and computations to be as open and transparent as possible.

Another limitation of these results could necessarily be the effects of reverse causality and endogeneity. Whilst any potential correlation between inequality and economic shrinking will be shown and discussed, it could be reasonable to assume that economic shrinking causes inequality, as opposed to the other way around. Fixed-effects methodology, robust standard errors, and moving averages, negating the need for lags, are attempts to help mitigate this point but should also be considered when interpreting results. Instrumental variable regressions are generally considered an appropriate strategy for dealing with such

issues. However, as this study represents the first exploration, to the best of the author's knowledge, using such data and methodological techniques is more appropriate for future research. As this study is an attempt to identify potential inequality trends and correlation it must always be remembered to not necessarily represent causation when interpreting the results.

4 Results

The purpose of this study is to provide a pooled analysis of countries and regions through a *social capabilities* theoretical framework. As such, specific regions are not individually investigated in depth and presented in this paper. However, such results could offer advantages for future researchers that might wish to investigate such trends. It is in this regard that additional regional specific trends can be found in *Appendices B* of this paper for anyone who might be interested in such findings.

4.1 Gini Coefficient and Economic Shrinking

We begin by investigating a simple correlation between the Gini Coefficient and the Economic Shrinking Frequency Ratio, which is shown in *Figure 2*. A clear positive trend can be observed between the two variables, suggesting that increases in income inequality have a relationship to increases in the frequency in which an economy shrinks. What is also evident is the geographical region clustering that underlines these trends. East Asian economies for instance tend to exhibit the lowest frequencies of economic shrinking and generally the lowest levels of inequality. Sub-Saharan Africa economies on the other hand tend to operate around higher frequencies of shrinking with higher rates of inequality. What also becomes evident however is that there are economies across the three different geographical regions that have similar rates of income inequality but vastly different frequencies of economic shrinking. As such, this simple graphical depiction gives us cause to investigate the relationship in greater depth. Argentina and Zambia appear to be outlier economies with this visual inspection as they not only seem to be extreme in the pooled trends, but regional trends as well. South Korea could arguably also be included in this depiction, however as it does not radically differ from the regional trends it was deemed appropriate to still be included. *Figure 3* depicts the relationship with the restricted country sub-sample and a strong relationship can still be observed. As we shall see, these patterns are repeated in other measures under investigation which gives further cause to examine the relationships with and without the involvement of Zambia and Argentina.

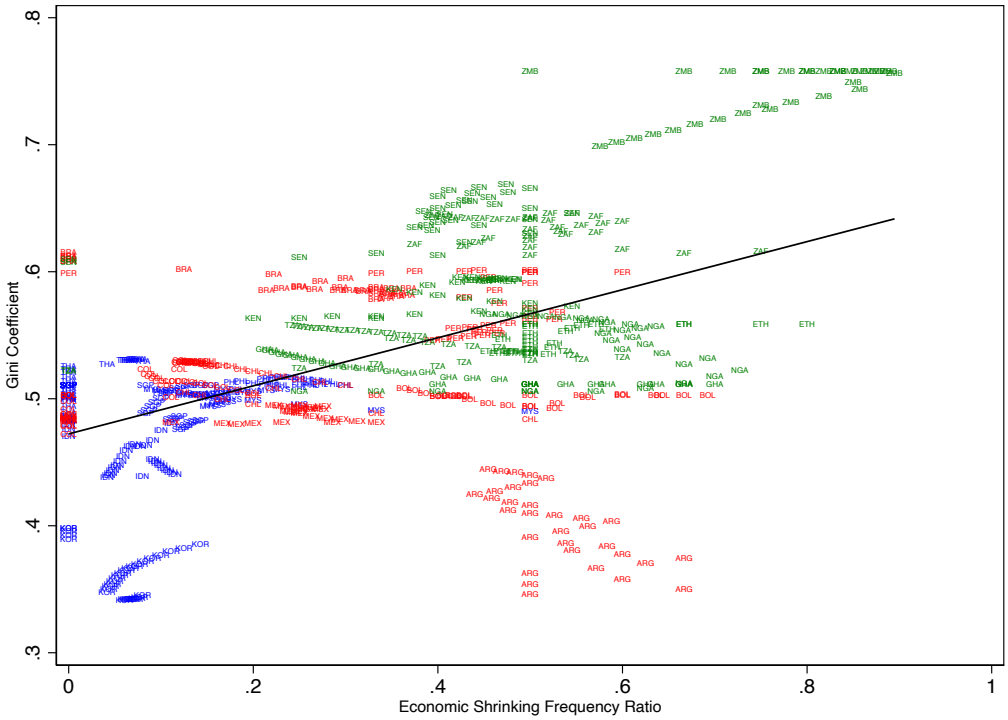

Figure 2: Economic Shrinking Frequency Ratio vs Gini Coefficient (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

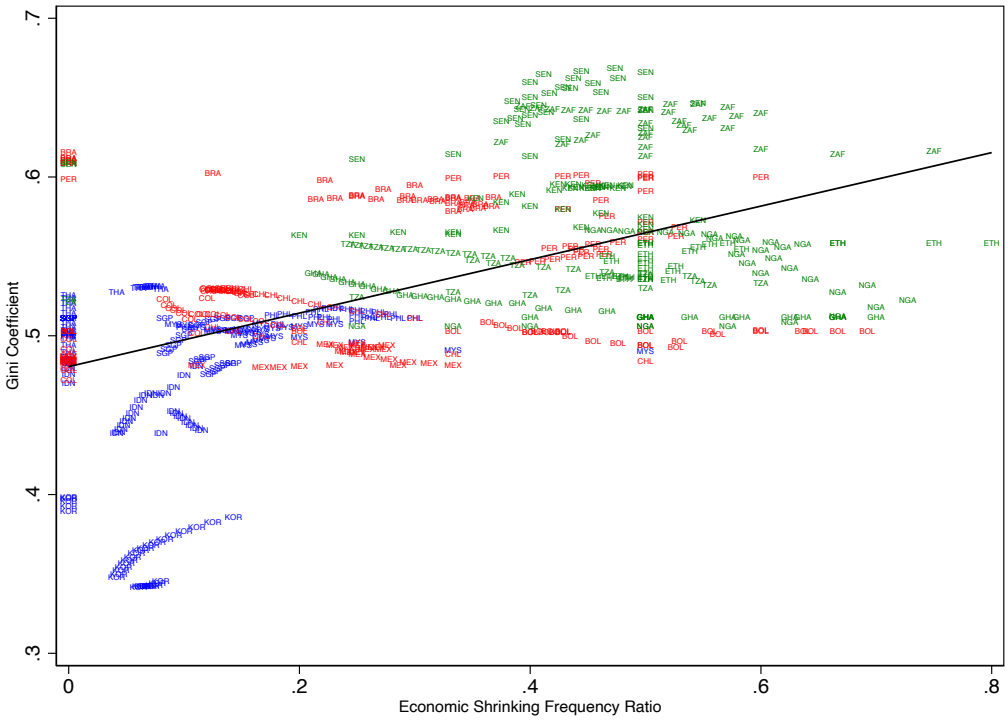

Figure 3: Economic Shrinking Frequency Ratio vs Gini Coefficient with Country Restrictions (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

The more formal analysis using pooled regressions are shown in *Table 2*, as such specifications allow for more precise conclusions to be inferred. Firstly, all F-tests report >0.0000 rejecting the null hypothesis and indicating that every model holds some explanatory power. The adjusted R^2 are also given for the random-effects models and within-group R^2 reported for the fixed-effects models. These statistics show strong increases with the stepwise introductions of the *social capabilities*, indications of increased explanatory power.

Table 2: Economic Shrinking Frequency Ratio with Gini Coefficient (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Coefficient	**1.304*** **	**1.539*** **	**1.358*** **	**1.253*** **	**1.009*** **	**-0.813** **	**-0.743***
	(0.0946)	(0.385)	(0.389)	(0.370)	(0.317)	(0.305)	(0.373)
GDP per capita (log)	**-0.0389*** **	-0.0930	-0.0789	0.0809	0.00170	-0.0228	0.0856
	(0.00917)	(0.0907)	(0.0814)	(0.0821)	(0.0954)	(0.141)	(0.153)
Agriculture VA (log)		0.0792	0.00259	0.0447	0.0416	**-0.142*** **	-0.101
		(0.0569)	(0.0401)	(0.0361)	(0.0382)	(0.0511)	(0.0712)
Agriculture Emp. %		0.000794	-0.0299	-0.0150	-0.00962	**0.0613***	**0.0688** **
		(0.0449)	(0.0297)	(0.0197)	(0.0192)	(0.0359)	(0.0305)
Industry VA (log)		0.0235	**0.0929***	0.0164	0.00302	0.0867	-0.0404
		(0.0571)	(0.0477)	(0.0431)	(0.0395)	(0.126)	(0.154)
Industry Emp. %		0.00750	-0.0276	-0.0130	-0.00108	0.0787	**0.0839** **
		(0.0446)	(0.0281)	(0.0197)	(0.0196)	(0.0482)	(0.0402)
Services VA (log)		**-0.122** **	**-0.117** **	**-0.0753** **	**-0.0537** **	-0.0859	-0.170
		(0.0558)	(0.0472)	(0.0287)	(0.0252)	(0.197)	(0.183)
Services Emp. %		0.00738	-0.0284	-0.0142	-0.00389	**0.0896** **	**0.0986*** **
		(0.0465)	(0.0292)	(0.0194)	(0.0192)	(0.0393)	(0.0348)
CBI			**0.386***	0.179	0.215	**0.206***	0.138
			(0.211)	(0.172)	(0.169)	(0.121)	(0.114)
Inflation			**0.00149** **	**0.00102** **	**0.000962** **	**0.000883*** **	**0.00115*** **
			(0.000564)	(0.000384)	(0.000386)	(0.000201)	(0.000202)
Human Capital Ratio				**0.180***	**0.158** **	**-0.501*** **	**-0.468*** **
				(0.0882)	(0.0749)	(0.139)	(0.132)
Under 5's Mortality Rate				**0.00258*** **	**0.00343*** **	**0.00330** **	**0.00494*** **
				(0.000484)	(0.000646)	(0.00159)	(0.00138)
Military Expenditure %GDP				0.0154	0.00370	**0.0198** **	**0.0251** **
				(0.0101)	(0.0108)	(0.00854)	(0.0109)
Total Domestic Civil MEPV					0.00456	**-0.0288*** **	**-0.0471** **
					(0.00745)	(0.0105)	(0.0174)
Total Border States MEPV					**0.0261** **	-0.00885	**-0.0207*** **
					(0.0105)	(0.00842)	(0.00719)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	672	671	637	621	621	621	567
Adjusted/Within R-squared	0.288	0.488	0.601	0.710	0.730	0.433	0.483

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

The Gini Coefficient maintains a positive relationship throughout the random-effects specifications but becomes negative when fixed-effects methodology is introduced in the final models (6) and (7). This is the opposite relationship that was expected and indicates that an increase of the Gini Coefficient is associated with a decrease in the Economic Shrinking Frequency Ratio. Whilst the opposite than expected trend is observed, it is not entirely surprising as the final models (6) and (7) are concerned with within-country variation as opposed to the between-country variations of models (1)-(5). The final pooled model (6) thus gives us a Gini Coefficient output of -0.813 and statistically significant at a 5% confidence interval. This means that if the Gini Coefficient increases by one unit, this is associated with a 0.813% decrease in the frequency of economic shrinking holding all other variables constant. The Gini remains statistically significant across all specifications but notably shows less significance and magnitude once country restrictions have been introduced in model (7). This suggests that even when controlling for 'outlier' economies the results are still not radically altered but country heterogeneity can play an influential part. The inclusion of *accountability* social capabilities has the greatest controlling effects on the Gini Coefficient, which is unsurprising due to how education and health effect inequality. However, an important technicality to address here when interpreting these results is that of multicollinearity. Multicollinearity is when one predicter can be reasonably estimated by another variable in the model which can ultimately give inaccurate output results. Using a variance inflation factor (VIF) test, the Gini Coefficient reported a low value of 2.53 for the random-effects models, indicating that multicollinearity is not a problem for this variable.

This sub-section then investigates the effects of the Gini Coefficient when interacted with a geographic region dummy variable whilst holding all other variables constant, see *Table 3*. Important to note with any interpretation below is that the East Asian region acts as a baseline with Latin America and Sub-Saharan Africa values being compared to it. As such, an increase in the Gini Coefficient for the East Asian region is associated with an increased frequency of economic shrinking, holding all other variables constant. This trend is opposite for Latin America however it is important to note the very large difference once Argentina is not included in the sample, with both the magnitude and statistical significance dramatically decreasing. Sub-Saharan Africa on the other hand offers a different story with the statistically negative trend being greatly re-enforced by the omission of Zambia. The clear differences that each region might face offer interesting insights into income inequality when the Gini is used. The negative statistical relationship in *Table 2* for instance appears to be mainly driven by trends in Latin America and Sub-Saharan Africa.

Table 3: Economic Shrinking Frequency Ratio with Gini Coefficient and Region Interactions (Author's Calculations).

	Economic Shrinking Frequency Ratio		
	(5)	(6)	(7)
Gini Coefficient:			
East Asian (baseline)	-1.143	0.542	0.00399
	(0.778)	(0.527)	(0.482)
Latin America	0.684	**-3.029*****	-0.347
	(0.630)	(0.573)	(1.456)
Sub-Saharan Africa	**3.045*****	-0.655	-1.881
	(1.045)	(1.052)	(1.245)
Fixed-Effects with Driscoll-Kraay Standard Errors		x	x
Country Restriction			x
Observations	621	621	567
Adjusted/Within R-squared	0.830	0.459	0.488

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*. The effect of the *Inclusion* variable for the geographic regional dummy of interest would then be given by the sum of β1X + β2*Inclusion*, whilst the effect of the baseline region would be given as β2Inclusion only. For example, any interpretation of Latin America should add the coefficient value from this region with the corresponding East Asian coefficient, whereas the East Asian coefficient can be solely interpreted.

These results can offer interesting insights that perhaps suggests different aspects other than inclusion underline the economic shrinking frequency in these two regions. Argentina could be a fascinating country for future economic shrinking research as these results could suggest that increases in income inequality are associated with large decreases in the frequency of economic shrinking, though the degree to which they affect the results would perhaps suggest they are a special case. Zambia on the other hand perhaps reflects their income inequality being highly correlated to their frequency of economic shrinking and maybe a key area of focus for future country research.

In the context of the entire theoretical framework being utilised, other interesting, and some surprising results materialise from *Table 2*. Inflation, Under 5's Mortality Rate, Human Capital Ratio, and Military Expenditure are all statistically significant with statistically positive trends, showing the relationships that would be expected. Structural *transformation* variables on the other hand present an interesting picture. Increases in employment in any given sector are associated with increased economic shrinking frequency, holding all other variables constant, however the opposite relationship is true for value-added. This reflects that structural change can be a highly disruptive event and interestingly suggests that unless the move is into higher value-added activities, the disruptions are likely to lead to an increase in economic shrinking frequency not less. However, as the structural transformation variables included both

employment and value-added, these variables reported very high VIF results and thus any interpretation should be treated with caution. The most surprising result however is when *social stability* is introduced with fixed-effects methodology by showing a statistically negative relationship to economic shrinking. One interpretation of this could be that the risk of social conflict increases as economic development takes place and as such, we would see a negative trend alongside a reduced frequency of economic shrinking, although this again could be a topic of future research.

In summary, an increase in the Gini Coefficient is statistically significant and associated with a decrease in the frequency of economic shrinking for a pooled regression. However, once this relationship is investigated by interacting different regional effects, the significance disappears, except for Latin America which is in turn primarily driven by the inclusion of Argentina. Latin America and Sub-Saharan Africa appear to be the regional drivers of this trend overall. Aspects of the *accountability* social capability, in particular human capital, appear to be a much bigger potential driver of building resilience to economic shrinking.

4.2 Palma Ratio and Economic Shrinking

As with the Gini, we start by investigating a simple correlation between the Palma Ratio and the Economic Shrinking Frequency Ratio, which is shown in *Figure 4*. We investigate the Palma Ratio to next consider the distribution of income inequality when compared against the Gini Coefficient. Once again, we can see a clear and statistically positive relationship between the Palma Ratio and the frequency of economic shrinking. There is also reflected the same trend in geographic region clustering as previously observed with the Gini. East Asian economies exhibit the lowest Palma Ratio observations along with the lowest frequencies of economic shrinking. Zambia and Argentina also appear as outlier observations and *Figure 5* depicts the relationship with these two countries omitted. Interestingly, Sub-Saharan Africa economies appear to have a much wider variation in the Palma Ratio but still consistently the highest frequencies of shrinking when compared to the other regions. The Palma Ratio measures the distribution of income when compared to the Gini which could be an indication that Sub-Saharan countries are still vulnerable to shrinking episodes despite some economies seemingly having more equal income distributions. This inspection also gives us cause to investigate any relationship more formally.

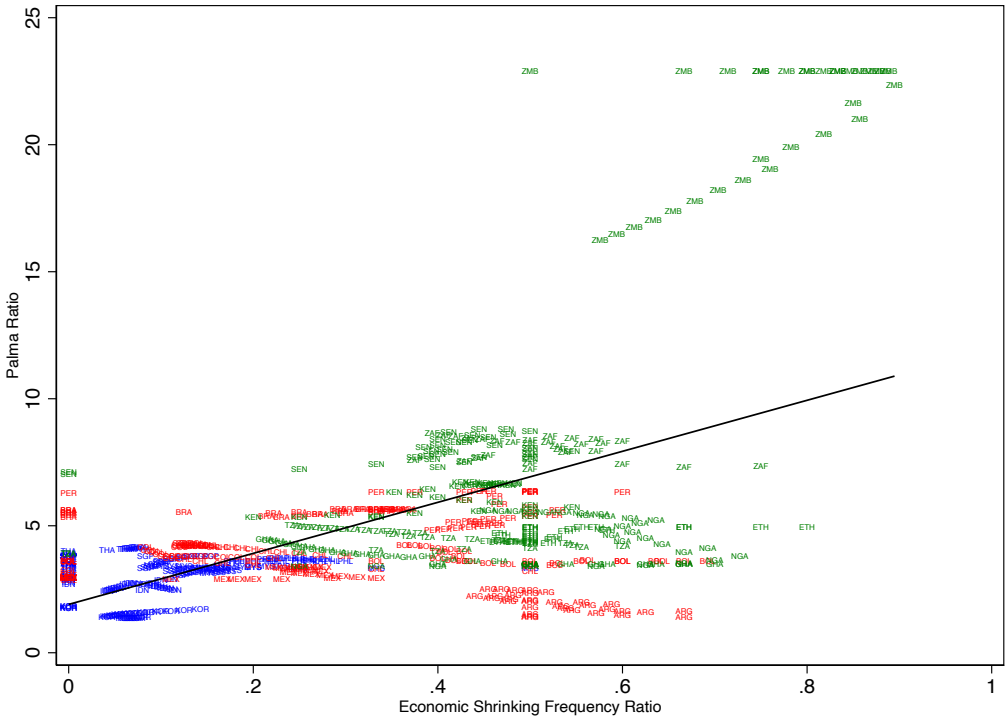

Figure 4: Economic Shrinking Frequency Ratio vs Palma Ratio (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

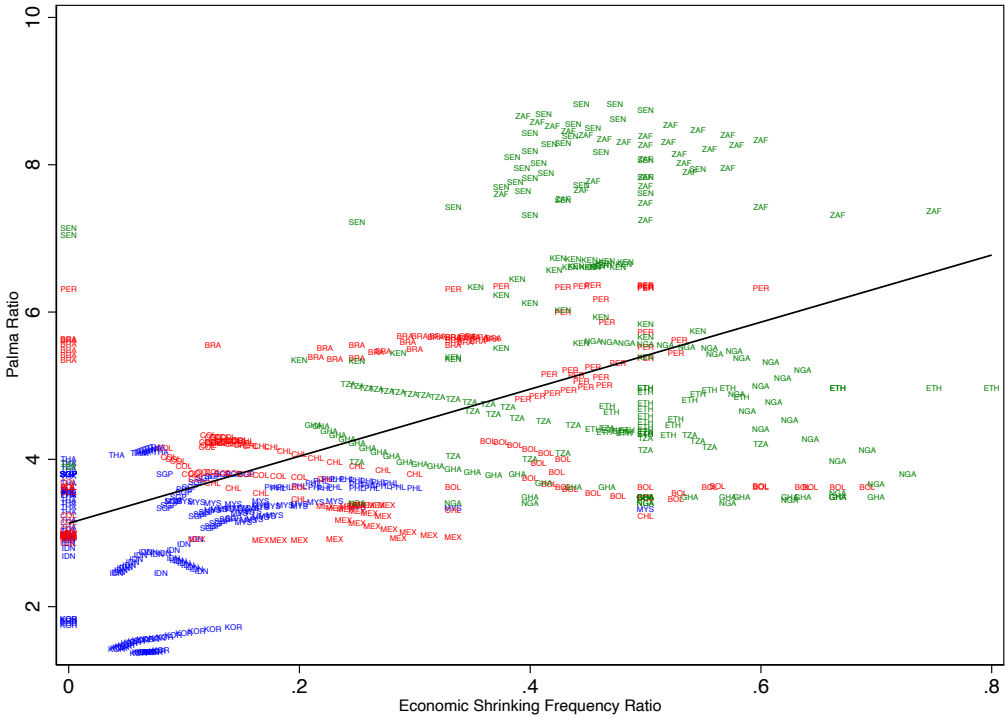

Figure 5: Economic Shrinking Frequency Ratio vs Palma Ratio with Country Restrictions (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

Table 4 shows the investigation of the Palma Ratio and its potential relationship with the frequency of economic shrinking. All F-tests report >0.0000 thus rejecting the null hypothesis and indicating that every model holds some explanatory power. The adjusted R^2 are also given for the random-effects models and the within-group R^2 reported for the fixed-effects models. These statistics again show strong increases with the stepwise introductions of the *social capabilities*, indications of increased explanatory power.

The Palma Ratio maintains a statistically positive relationship throughout all model specifications, except when country restrictions are introduced in model (7). These results are interesting as they are more robust to different empirical techniques than the Gini Coefficient was, which perhaps speaks to the Palma Ratio being a better measure of income inequality when considering the frequency of economic shrinking. The final fixed-effects model (6) however is not statistically significant and has a low economic significance with an output of 0.00490. When country restrictions are introduced in model (7) the relationship becomes statistically negative and remains statistically insignificant. Whilst the Palma Ratio perhaps presents a more appropriate measure of income inequality, due to its consistency, it also paints a picture that income inequality is not a key driver of the frequency of economic shrinking. What is evident by the reversal of the signs between models (6) and (7) is that country heterogeneity can play an important role in how income inequality affects the frequency of economic shrinking. The Palma Ratio also returned a value of 2.29 using a VIF test, indicating that multicollinearity is not an issue when interpreting this variable for the random-effects models. These results suggest that the income distribution in income inequality is not particularly significant when looking at the frequency of economic shrinking.

Table 4: Economic Shrinking Frequency Ratio with Palma Ratio (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Palma Ratio	**0.0293*** **	**0.0345*** **	**0.0315*** **	**0.0329*** **	**0.0321*** **	0.00490	-0.0249
	(0.00182)	(0.00480)	(0.00455)	(0.00294)	(0.00413)	(0.00700)	(0.0174)
GDP per capita (log)	**-0.0444*** **	-0.0367	-0.0211	**0.124** **	0.111	0.0182	0.149
	(0.00863)	(0.0769)	(0.0553)	(0.0564)	(0.0775)	(0.150)	(0.141)
Agriculture VA (log)		0.0874	0.0212	**0.0667** **	**0.0694** **	**-0.126** **	-0.100
		(0.0516)	(0.0324)	(0.0256)	(0.0301)	(0.0547)	(0.0694)
Agriculture Emp. %		0.0121	-0.0160	-0.0129	-0.0184	**0.0740***	**0.0675***
		(0.0325)	(0.0218)	(0.0164)	(0.0155)	(0.0398)	(0.0332)
Industry VA (log)		-0.00778	0.0556	-0.0224	-0.0407	0.0594	-0.0821
		(0.0638)	(0.0521)	(0.0255)	(0.0306)	(0.129)	(0.138)
Industry Emp. %		0.0142	-0.0175	-0.0114	-0.0140	**0.0919***	**0.0828***
		(0.0333)	(0.0228)	(0.0168)	(0.0152)	(0.0520)	(0.0428)
Services VA (log)		**-0.107***	**-0.105** **	**-0.0618** **	**-0.0455** **	-0.0709	-0.177
		(0.0547)	(0.0478)	(0.0226)	(0.0194)	(0.200)	(0.182)
Services Emp. %		0.0191	-0.0135	-0.0106	-0.0144	**0.105** **	**0.0978** **
		(0.0341)	(0.0212)	(0.0161)	(0.0149)	(0.0444)	(0.0382)
CBI			**0.359** **	**0.272** **	**0.284** **	0.124	0.0971
			(0.157)	(0.109)	(0.106)	(0.112)	(0.118)
Inflation			**0.00130*** **	**0.000892*** **	**0.000871*** **	**0.000967*** **	**0.00120*** **
			(0.000425)	(0.000272)	(0.000284)	(0.000187)	(0.000191)
Human Capital Ratio				0.0519	0.0458	**-0.310** **	**-0.470*** **
				(0.0562)	(0.0518)	(0.126)	(0.147)
Under 5's Mortality Rate				**0.00228*** **	**0.00278*** **	**0.00302** **	**0.00474*** **
				(0.000435)	(0.000533)	(0.00147)	(0.00132)
Military Expenditure %GDP				**0.0173** **	**0.0148***	**0.0186** **	**0.0249** **
				(0.00796)	(0.00855)	(0.00882)	(0.0108)
Total Domestic Civil MEPV					0.0105	**-0.0199***	**-0.0460** **
					(0.00665)	(0.00999)	(0.0171)
Total Border States MEPV					0.0111	-0.00590	**-0.0177** **
					(0.00840)	(0.00797)	(0.00666)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	672	671	637	621	621	621	567
Adjusted/Within R-squared	0.342	0.576	0.679	0.786	0.791	0.424	0.483

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

This sub-section proceeds by investigating the effects of the Palma Ratio when interacted with geographic region dummies whilst holding all other variables constant, see *Table 5*. Important to note with any interpretation below is that the East Asian region acts as a baseline with Latin America and Sub-Saharan Africa values being compared to it. Unsurprisingly the results reflect the main findings and trends with the previously discussed Gini Coefficient. There is no statistical significance except for Latin America, which is again

seemingly driven by the inclusion of Argentina. These results essentially return no economic effect either of the Palma Ratio on the frequency of economic shrinking, except in East Asian economies.

Table 5: Economic Shrinking Frequency Ratio with Palma Ratio and Region Interactions (Author's Calculations).

	Economic Shrinking Frequency Ratio		
	(5)	(6)	(7)
Palma Ratio:			
East Asian (baseline)	-0.0180	0.0326	0.0250
	(0.0368)	(0.0246)	(0.0280)
Latin America	0.0146	**-0.0890*****	-0.0293
	(0.0321)	(0.0269)	(0.0380)
Sub-Saharan Africa	0.0464	-0.0248	-0.0785
	(0.0392)	(0.0301)	(0.0475)
Fixed-Effects with Driscoll-Kraay Standard Errors		x	x
Country Restriction			x
Observations	621	621	567
Adjusted/Within R-squared	0.838	0.432	0.488

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*. The effect of the *Inclusion* variable for the geographic regional dummy of interest would then be given by the sum of $\beta 1X + \beta 2$*Inclusion*, whilst the effect of the baseline region would be given as $\beta 2$Inclusion only. For example, any interpretation of Latin America should add the coefficient value from this region with the corresponding East Asian coefficient, whereas the East Asian coefficient can be solely interpreted.

Other interesting results broadly support the findings from the previous Gini Coefficient findings. Structural *transformation* is associated with statistically positive trends when changes in employment are considered, yet statistically negative trends when it comes to value-added variables. *Accountability* measures also are statistically significant, with human capital increases seeming to be associated with the largest decreases in the frequency of economic shrinking. Once again, the *social stability* measures are surprisingly statistically negative and significant. This is the opposite of the trend that would have been expected and discussed briefly in the previous sub-section.

In summary, the Palma Ratio appears to show no economic effects of income inequality or statistical significance on the frequency of economic shrinking. The Palma Ratio is used to address the over-sensitivity of the Gini Coefficient to the middle of the income distribution and under-sensitivity to changes at the top of the income distribution. These results are suggestive of income inequality not being highly correlated with the frequency of economic shrinking. The results once again lead us to perhaps consider *accountability* measures of social capability as more important aspects to overall economic shrinking frequency. However, it is

once again important to highlight this study's focus on income rather than wealth inequalities. Although it is beyond the scope of this thesis, perhaps wealth inequalities could be more important to investigate in future research.

4.3 Poverty and Economic Shrinking

Now we turn to the final independent variable being investigated. We begin again by investigating a simple correlation between the $4.16 (PPP) per day Poverty Headcount and the Economic Shrinking Frequency Ratio, which is shown in *Figure 6*. When compared against the two previous discussion on income inequality some rather striking observations can be made. First, East Asian economies seem to have a much wider variance in their poverty headcounts than what was between income inequality. Some of these economies for instance experience poverty measures comparable to Sub-Saharan Africa economies whilst others have some of the lowest poverty measures recorded. Yet despite this variance, East Asian countries still experience the lowest overall levels of economic shrinking frequency. Latin America, with the exception again of Argentina, and Sub-Saharan Africa economies in general however tend to be clustered regionally, similar to previous observations. *Figure 7* also depicts the same relationship but with both Argentina and Zambia omitted. A positive trend can be observed and this can seemingly appear non-linear with these country omissions. However, important to note that when a quadratic line-of-best fit is applied, an almost identical linear relationship is still seen. These trends give us good cause to continue further in our analysis with formal investigations.

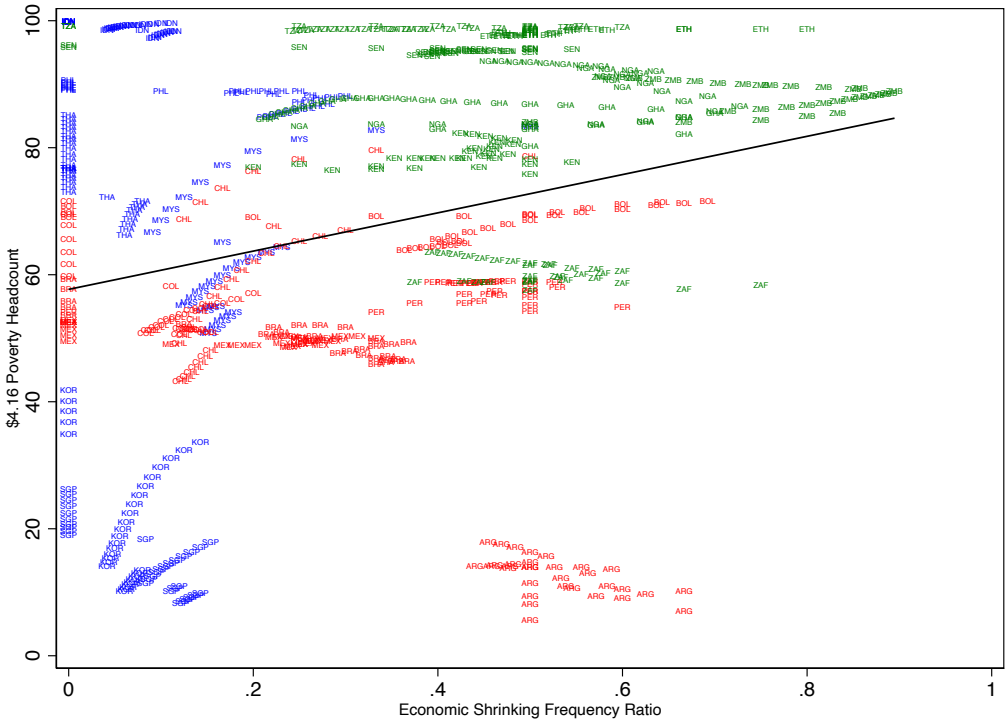

Figure 6: Economic Shrinking Frequency Ratio vs $4.16 per day Poverty Line Headcount (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

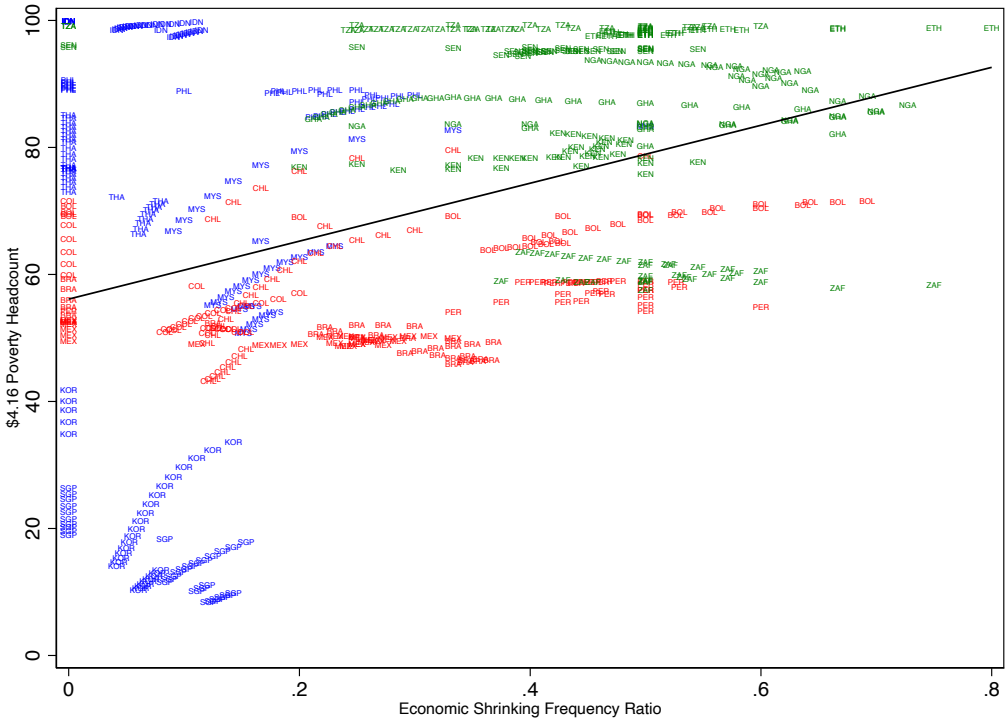

Figure 7: Economic Shrinking Frequency Ratio vs $4.16 per day Poverty Line Headcount with Country Restrictions (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

The final formal investigation is presented below in *Table 6*. All F-tests report >0.0000 thus rejecting the null hypothesis and indicating that every model holds some explanatory power. The adjusted R^2 are also given for the random-effects models and the within-group R^2 reported for the fixed-effects models. These statistics show strong increases with the stepwise introductions of the *social capabilities*, indications of increased explanatory power.

The $4.16 per day Poverty Headcount variable remains statistically negative until fixed-effects methodology is introduced in models (6) and (7). This variable also becomes statistically significant with the introduction of the *social stability* aspect in model (5) and remains statistically significant thereafter. The complete pooled final model (6) thus gives a statistically significant result at a 1% confidence level. This significance level is maintained and the economic significance increases when country restrictions are introduced in model (7). Whilst this may seem not to be a large economical effect it is worth remembering the scale being used. Model (6) for example indicates that a 1 unit increase in the $4.16 per day Poverty Headcount Ratio is associated with a 0.32% increase in the frequency of economic shrinking. However, the overall mean value of the $4.16 per day Poverty Headcount Ratio is 67.255 with a standard deviation of 26.542. Such indications suggest that levels of poverty have a much more dramatic relationship to economic shrinking than captured in previous discussions on income inequality. Important to remember here however is that the variables are moving averages to represent trend analysis and such a specific statistical interpretation should be treated with caution. What thus becomes immediately clear is the seemingly greater importance that poverty holds against the frequency of economic shrinking, even at the relatively high $4.16 per day poverty line. To address the technicality of multicollinearity a VIF test was used for the random-effects models. The $4.16 per day Poverty Line variable returned a value of 9.32, indicating the multicollinearity is a potential issue with this variable. However, a high variance inflation rate increases the likelihood of p-values being overinflated and thus not within a statistically significant range. The poverty variable maintains statistical significance at a 1% confidence interval even with a high variance inflation rate which gives further credence to high significance this relationship might have.

Table 6: Economic Shrinking Frequency Ratio with $4.16 per day Poverty Line Headcount (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$4.16 Poverty Line	-9.66e-05	-0.00408	-0.00447	-0.00386	**-0.00377***	**0.00319*****	**0.00660*****
	(0.000605)	(0.00328)	(0.00274)	(0.00276)	(0.00190)	(0.000823)	(0.00125)
GDP per capita (log)	**-0.0820*****	-0.181	**-0.182***	-0.0579	-0.176	0.0734	**0.263***
	(0.0192)	(0.139)	(0.104)	(0.147)	(0.111)	(0.128)	(0.146)
Agriculture VA (log)		-0.0322	**-0.130***	-0.0855	-0.0606	**-0.101****	-0.0747
		(0.0830)	(0.0701)	(0.0752)	(0.0397)	(0.0445)	(0.0828)
Agriculture Emp. %		0.0223	-0.0111	-0.0128	-0.00258	**0.0714***	**0.0698*****
		(0.0306)	(0.0220)	(0.0195)	(0.0192)	(0.0367)	(0.0247)
Industry VA (log)		0.189	**0.270****	0.164	**0.116***	0.0783	-0.0315
		(0.116)	(0.0966)	(0.111)	(0.0656)	(0.125)	(0.165)
Industry Emp. %		0.0174	-0.0194	-0.0165	0.00600	**0.0894***	**0.0827****
		(0.0310)	(0.0227)	(0.0202)	(0.0216)	(0.0480)	(0.0334)
Services VA (log)		**-0.186****	**-0.171*****	**-0.0997****	**-0.0666***	-0.0514	-0.146
		(0.0663)	(0.0445)	(0.0448)	(0.0374)	(0.188)	(0.165)
Services Emp. %		0.0235	-0.0174	-0.0181	0.00160	**0.104****	**0.106*****
		(0.0314)	(0.0228)	(0.0198)	(0.0198)	(0.0408)	(0.0285)
CBI			**0.684*****	**0.534*****	**0.503*****	**0.204****	**0.340****
			(0.204)	(0.153)	(0.162)	(0.0963)	(0.140)
Inflation			**0.00154*****	**0.00111****	**0.000978****	**0.000864*****	**0.00107*****
			(0.000506)	(0.000393)	(0.000376)	(0.000187)	(0.000172)
Human Capital Ratio				0.0945	0.0833	**-0.349*****	**-0.399*****
				(0.0901)	(0.0858)	(0.106)	(0.135)
Under 5's Mortality Rate				**0.00249*****	**0.00391*****	**0.00298****	**0.00474*****
				(0.000651)	(0.000924)	(0.00145)	(0.00101)
Military Expenditure %GDP				-0.00617	-0.0219	**0.0215****	**0.0321****
				(0.0193)	(0.0162)	(0.00923)	(0.0151)
Total Domestic Civil MEPV					0.00892	**-0.0205****	**-0.0456*****
					(0.00960)	(0.00862)	(0.0144)
Total Border States MEPV					**0.0433****	-0.00642	**-0.0209*****
					(0.0153)	(0.00887)	(0.00653)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	672	671	637	621	621	621	567
Adjusted/Within R-squared	0.086	0.338	0.508	0.634	0.698	0.430	0.503

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Once again, we next investigate the effects of the $4.16 Poverty Headcount when interacted with geographic region dummies whilst holding all other variables constant, see *Table 7*. Important to note with any interpretation below is that the East Asian region acts as a baseline with Latin America and Sub-Saharan Africa values being compared to it. The regional interactions are all statistically significant both with and without country restrictions. This once again highlights that using poverty measures over income inequality measures in research might

offer a more important relationship insight with respect to the frequency of economic shrinking. East Asia has an increased effect of poverty in this measure from the main results whereas poverty is associated with a statistically negative relationship in Latin America and Sub-Saharan Africa. Once Argentina is omitted then the relationship between poverty and economic shrinking reverses for Latin America, exhibiting a statistically positive relationship, although at a weaker economic effect compared to the main results. Sub-Saharan Africa however experiences an increased effect from the omission of Zambia which is the opposite of the relationship we would have expected. One interpretation of this result is that whilst poverty is high in the Sub-Saharan region, it does not account for the very high shrinking frequencies experienced by the economies there. Perhaps other underlying factors need to be addressed concerning the frequency of economic shrinking. Another explanation could be the small sample size for Sub-Saharan Africa. There are many more countries within this region than the other two regions which plausibly could have regional trends of their own. The omission of Zambia for example only leaves South Africa as the sole representation of the Southern African region, and we have already seen what a large effect the omission of outlier countries can have on the results.

Table 7: Economic Shrinking Frequency Ratio with $4.16 per day Poverty Line Headcount and Region Interactions (Author's Calculations).

	Economic Shrinking Frequency Ratio		
	(5)	(6)	(7)
$4.16 Poverty Line			
East Asian (baseline)	-0.000756	**0.0215*** **	**0.0214*** **
	(0.00213)	(0.00240)	(0.00205)
Latin America	**-0.00419** **	**-0.0242*** **	**-0.0184*** **
	(0.00185)	(0.00484)	(0.00313)
Sub-Saharan Africa	-0.00432	**-0.0280*** **	**-0.0451*** **
	(0.00295)	(0.00570)	(0.00800)
Fixed-Effects with Driscoll-Kraay Standard Errors		x	x
Country Restriction			x
Observations	621	621	567
Adjusted/Within R-squared	0.791	0.523	0.589

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*. The effect of the *Inclusion* variable for the geographic regional dummy of interest would then be given by the sum of β1X + β2*Inclusion*, whilst the effect of the baseline region would be given as β2Inclusion only. For example, any interpretation of Latin America should add the coefficient value from this region with the corresponding East Asian coefficient, whereas the East Asian coefficient can be solely interpreted.

Moving to briefly cover the theoretical framework at large. We once again see results and trends broadly in line with the previously considered income inequality variables.

Measures used for the *accountability* social capability seem to consistently have the most statistically significant associated effects when building resilience to economic shrinking. Increases in human capital are associated with decreases in the frequency of economic shrinking. Under 5's mortality rate increases are associated with increased frequency of economic shrinking. Military expenditure increases are also associated with increases in economic shrinking frequency. Interestingly, CBI has also been associated with increases in the frequency of economic shrinking which is the opposite that would have been expected. Two interpretations of this could initially be made. First, developing countries might be more prone to the de facto pressures of governmental states due to lower quality institutions and this is reflected in the results by having too loose monetary policy. The second reason could perhaps be too strict monetary policy as if a central bank is too insulated from state interests, then this might lead to lower output and higher levels of unemployment. Both of which are likely to affect developing nations more than developed nations as they usually lack the same levels of social security and economic complexity. The consistent statistical significance of inflation unsurprisingly also suggests that increases in inflation are associated with increased frequency of economic shrinking.

In summary, poverty levels seem to have a much more significant effect on economic shrinking frequency than income inequality. Higher poverty levels are associated with increased frequency of economic shrinking, although this trend doesn't hold for the Sub-Saharan Africa region. High levels of poverty are observed across some East Asian economies as well and they still experience low frequencies of economic shrinking which, once again, suggests that other social capability aspects could be more important fundamentals in building a resilience to economic shrinking.

4.4 Discussion

What then is the relationship between income inequality and poverty with respect to the frequency of economic shrinking for developing economies? Overall income inequality does not appear to have a significant effect when all the results are considered. The Gini Coefficient returned a statistically negative relationship but once the Palma Ratio is considered this relationship disappears. This relationship is not entirely unexpected, as previous studies have produced mixed results before when focused on economic growth (Li & Zou, 1998,

Forbes, 2000, Birdsall, 2006, Easterly, 2006, and Assa, 2012). These results are also in line with recent findings from Huang, Fang, Miller & Yeh (2015) who found income inequality was not a significant factor with negative growth rates. As their study was focused on U.S. States however, these results are intriguing because developed and developing countries exhibit different growth and development dynamics. Potentially then these results offer evidence for the relevance of *inclusion* being an important consideration in any *social capabilities* framework in the first instance and the overall theory's legitimacy.

The Gini Coefficients statistically negative relationship with economic shrinking appears to be mostly driven by Latin America and Sub-Saharan Africa economies. This leads us to ask why East Asian economies might be different in this regard, although such a question would likely strike at the heart of their development success over the last 50 years. Latin America and Sub-Saharan Africa tend to be at lower country income levels than the East Asian economies so perhaps future research could focus on the different stages of development each economy might face. Another reason could also be that East Asian countries started out their post-Second World War development journeys with much more egalitarian societies, in terms of income inequality and human capital at least. As such, fewer resources were needed to address income inequality concerns with the lower starting point already endowing a strong *inclusion* social capability. Income inequality appears to be highly susceptible to both data and methodology used, particularly when using the Gini Coefficient and considering potential 'outlier' economies. The over-sensitivity of the Gini Coefficient to the middle of the income distribution could be a reason why the relationship disappears when using the Palma Ratio which suggests future researchers should consider the appropriateness of their income inequality measures carefully.

Poverty on the other hand produces highly significant results and could represent a more important measure of *inclusion* with regards to economic shrinking frequency for developing countries. It appears to be a strong factor in East Asia and a relevant aspect for Latin America as well. Sub-Saharan Africa seems to experience the opposite trend than would have been expected which is unusual considering the high instances of poverty in the region. Sub-Saharan Africa is the region with the highest levels of economic shrinking, and it appears to be that other institutional factors are of greater influence in this regard. Although this does not negate the distinct possibility of Sub-Saharan Africa economies being characterised as in a 'poverty-trap' with such findings being consistent with research from Ravallion (2012). Poverty reduction may then be the more important factor, as opposed to income inequality, in building resilience to economic shrinking for developing economies.

If poverty reduction is a key goal of policymakers, it is worth remembering that it does not operate in a vacuum. Income inequality maintains a close relationship with poverty through the poverty-growth-inequality triangle (Bourguignon, 2004). As such, any economic growth in high-income inequality societies will lead to limited poverty reduction and thus increased susceptibility to shrinking. It is through this lens that income inequality should be considered with policy design, perhaps through redistribution measures, focused on an end goal of poverty eradication. It is important to remember however that redistribution efforts tend to be limited by how progressive the tax system is which could prove a limiting factor for developing countries. Redistribution efforts also tend to be based around wealth, as opposed to income. If income inequality does not appear to have a significant effect on economic shrinking, then perhaps wealth could play a much more important role. If wealth is much more concentrated, compared to income, then perhaps it is the distribution in means of production that helps economies achieve modern economic growth. A trend of declining wealth was established by Piketty (2014) in post-Second World War Europe for example, although wealth inequality has been increasing since the 1980s. It is beyond the ability of this thesis to answer such an enquiry and a potentially important path for future research. Perhaps then income inequality has more of an economic growth limiting effect, whilst poverty reduction is required to build a resilience to economic shrinking. Developing countries will need both growth and reduced shrinking in order to catch-up with developed economies which potentially puts even greater emphasis on considering the distributional impacts of economic growth.

The results also show that human capital exhibits a relationship that's suggestive of building resilience to economic shrinking, and poverty is also associated with lower education outcomes (Ferguson, Bovaird & Mueller, 2007). The significance of these results perhaps also suggesting that general measures of human capital help build a resilience to shrinking though more research must be undertaken in this regard. Squicciarini and Voigtländer's (2015) proposition that elite-knowledge leads to economic growth and general human capital leads to income-increases could thus be accurate though they perhaps lack an appreciation for the importance of building a resilience to economic shrinking. Encouraging innovation and entrepreneurship may thus not be as beneficial as previously suggested for long-term development if the general population is left behind. If poverty reduction also helps to release more entrepreneurs into the workforce (Doering, 2016), then we can easily see how lower levels of poverty can help to not only stimulate economic growth but also potentially help build resilience to economic shrinking. In this regard, the consistent significance of the *accountability* measures can perhaps lend evidence to suggest that this aspect is one of the more

fundamental social capabilities. The ability of the state to provide public goods, such as education and health care, to all could be a primary channel to help support poverty alleviation.

Another potentially important observation that materialises and should be discussed is the structural *transformation* aspect. Consistently observed throughout the analysis is that increases in employment percentages are associated with increased economic shrinking frequency. This is interesting as movement away from agriculture and towards industry or services is often considered a key aspect of economic development. However, increases in the value-added of each sector are associated with decreases in the economic shrinking frequency rate. This suggest that the patterns of transformation are important and moving towards higher productive activities could be the key to declining shrinking frequency rates. The implication being that change for the sake of change might lead to greater economic disruption that ultimately leads to less economic development than could have been achieved. These patterns hold for agriculture, industry, and services which perhaps contradicts the expectation that moves away from agriculture would increase resilience to economic shrinking. This could be an interesting line of future enquiry as different regions have had different structural transformation journeys. Such observations support findings from McMillan, Rodrik & Verduzco-Gallo (2014) and may also give greater credence to agriculture-led development as a viable option for greater economic prosperity. These growth patterns are also hypothesised to have greater impacts on poverty reduction (Christiaensen & Martin, 2018) which perhaps holds greater policy potential for high poverty countries, such as Sub-Saharan Africa economies.

Inclusion as a social capability aspect can thus be surmised to be extremely important to consider to more accurately account for societal change and country heterogeneity. However, it also appears that it is not always the most important aspect to consider from an economic shrinking frequency perspective. Poverty appears to have a much greater influence on economic shrinking frequency and could be investigated further in future research. Although income inequality cannot be ignored in its relationship to poverty reduction. The aspect of *accountability* seems to play a prominent role in country development and also warrants further research in the future. It is important to note however how accountability measures also affect poverty through various channels, such as education and health, and legislators should have poverty reduction firmly in mind, with perhaps an inequality of opportunity mindset, when designing policy.

5 Conclusion

The aim of this study was to investigate the relationship of income inequality and poverty on the frequency that developing countries might experience economic shrinking episodes. Income inequality, measured using the Gini Coefficient and Palma Ratio, produced generally insignificant results with mixed magnitudes and signs. The implication being that income inequality does not exhibit a strong relationship with the frequency that an economy might shrink. Important to note however is the role that country heterogeneity appeared to play and as such an individual country's income inequality levels should be considered carefully. In keeping in line with the literature on income inequality, perhaps this channel is more concerned with hindering economic growth rather than economic shrinking.

Poverty on the other hand shows a very strong relationship with economic shrinking frequency, being consistently statistically significant at a 1% confidence interval. The strength of this relationship is also shown across different geographic regions, though the magnitude and sign can vary. Higher poverty levels are associated with an increased frequency of economic shrinking in East Asian and Latin American economies though this relationship has a much higher magnitude for the East Asian region. Sub-Saharan Africa economies, however, display a statistically negative relationship between poverty and frequency of economic shrinking. The findings of this study are suggestive that poverty could be a more important aspect of *inclusion*, as opposed to income inequality, when considering the *social capabilities* framework and economic shrinking.

The results of this study also suggest that *inclusion* is an important aspect of a social capabilities framework but perhaps not a more fundamental aspect for less developed countries. *Accountability* measures, such as education and healthcare, also returned consistent significant results which could be a relevant avenue of future research. When taken all together, these results suggest that underlying institutional environments could be of more fundamental importance. This perhaps speaks more to the inequalities in opportunity that populations might face, suggesting policymakers should have poverty alleviation firmly fixed in their minds when it comes to public goods provision.

Developing countries undoubtably require economic growth to catch up with developed economies, and economic shrinking should also be taken into consideration for a more holistic approach to development. Whilst the moral implications for poverty eradication are self-apparent, this study hopes to contribute to existing literature by highlighting the economic need for such a focus as well. In this regard, poverty reduction can potentially play a major role and should be considered carefully for long-run growth to possibly be maintained. How to achieve poverty reduction is a key question for policymakers and it is through this channel that income inequality perhaps has an important more indirect role to play. These topics will only grow in importance with macro-trends such as climate change or the digital transformation disproportionately affecting the poor whilst increasing the fragilities that developing countries might face. The United Nations number one Sustainable Development Goal of poverty eradication by 2030 will be a difficult, but vital, target to work towards for long-term development to be achieved.

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Appendix A1 - Figures

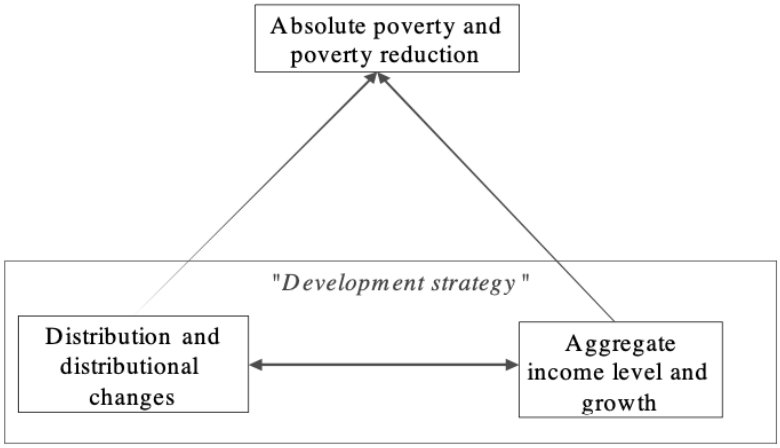

Figure 8: The Poverty-Growth-Inequality Triangle (Bourguignon, 2004).

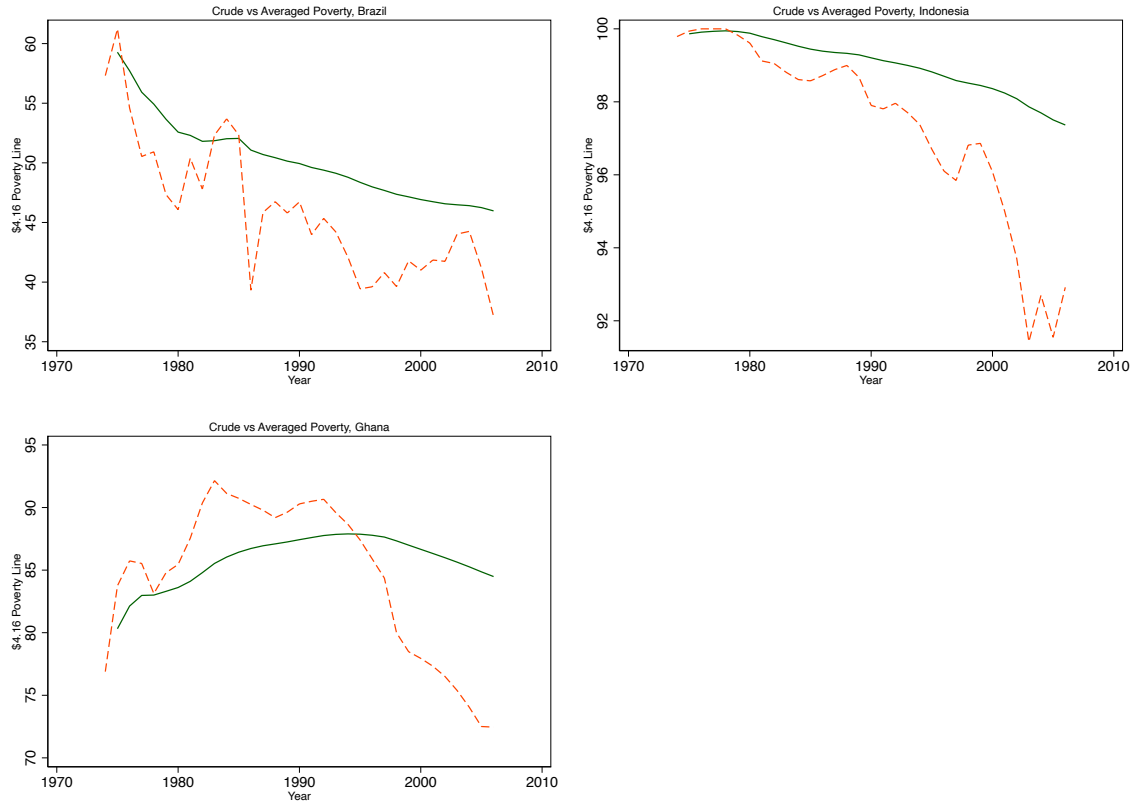

Figure 9: Crude (dotted) vs Averaged (solid) $4.16 per day poverty line measures for Brazil, Indonesia, and Ghana, respectively.

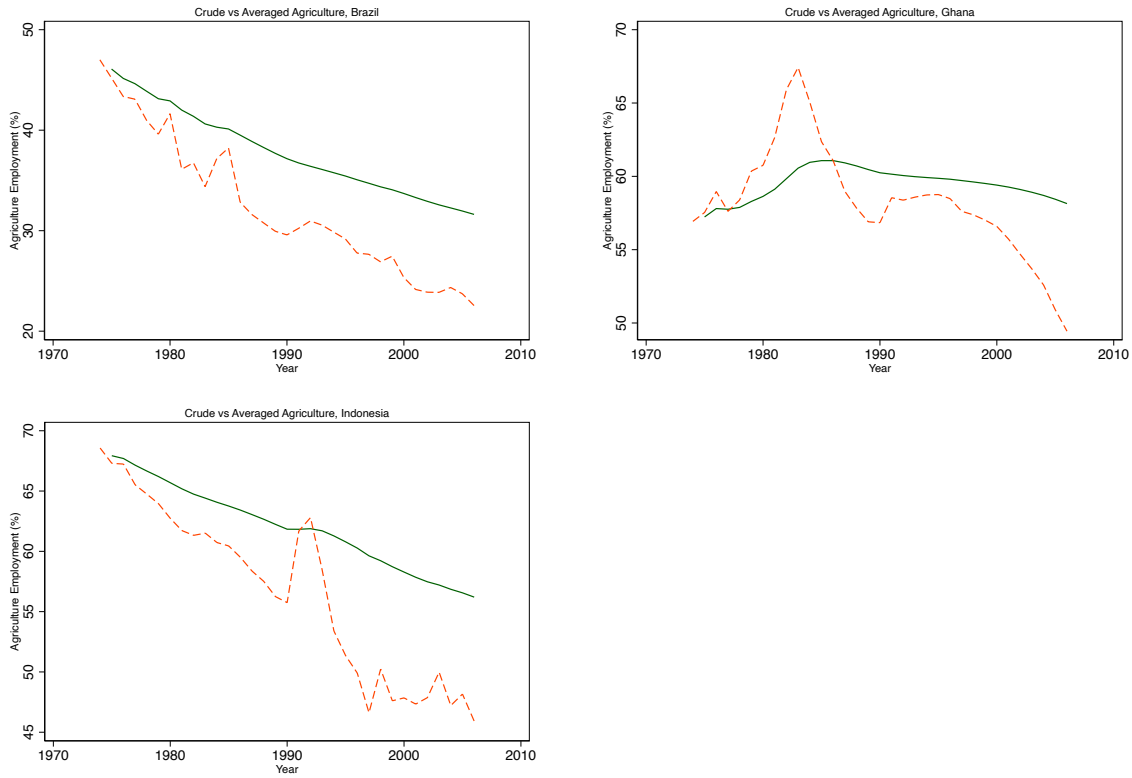

Figure 10: Crude (dotted) vs Averaged (solid) agriculture sector percentage measures for Brazil, Indonesia, and Ghana, respectively.

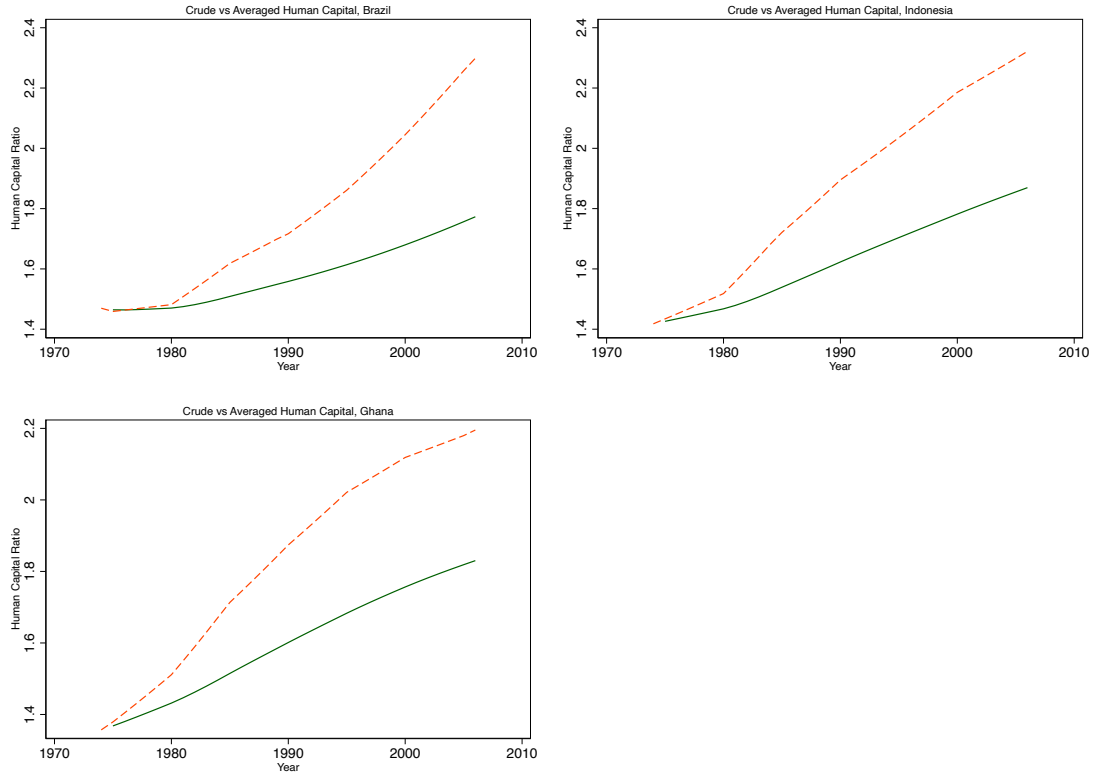

Figure 11: Crude (dotted) vs Averaged (solid) human capital ratio measures for Brazil, Indonesia, and Ghana, respectively.

$$(TBSV_{c,t}/TBS_{c,t})\ x\ BSVN_{c,t}$$

Figure 12: Border State Total Summed Violence Normalisation.

Here *TBSV* denotes the total summed measure of all border state violence, *TBS* denotes the total number of border states, and *BSVN* denotes the number of border states that violence has taken place. The subscripts *c* denotes the individual countries and *t* denotes time; thus observations take into consideration that the amount of border states that a country could face can change over time.

Appendix A2 - Tables

Table 8: List of countries in study by geographic region.

East Asia and Pacific	Latin America and Caribbean	Sub-Saharan Africa
Indonesia Malaysia Philippines Republic of Korea Singapore Thailand	Argentina Bolivia Brazil Chile Colombia Mexico Peru	Ethiopia Ghana Kenya Nigeria Senegal South Africa United Republic of Tanzania Zambia

East Asia and Pacific region: These countries were selected for this study as they represent the majority of economic activity, by GDP size, in the region and a large portion of the total population. Taiwan was also considered for this group however relevant data could not be collected from the same sources, compared to the other countries, so was not included for data methodologies to remain consistent. The East Asian region in general has seen significant developmental success over the last 50 years. Due to this, and the similar starting point compared to the other regions, is seen as an important case for comparison.

Latin America and the Caribbean: These countries were also selected for this study as they represent the majority of economic activity, by GDP size, in the region and a large portion of the total population. Latin America is generally considered to have high levels of inequality when compared to the rest of the world, and as such deemed appropriate for inclusion in this study.

Sub-Saharan Africa: These countries were selected as they represent a large portion of the total population size relative to their geographic location within the region, with representation from East, South, West, and Central of the continent. Sub-Saharan Africa represents one of the regions of the world that are considered to be the most ‘behind’ in terms of development and as such could not be ignored when considering a theory behind long-term developmental success.

Table 9: Variable summary, including mean treatment and data sources.

Category	Variable	Variable Mean Treatment	Source
Economic	Economic Shrinking Frequency Ratio	Arithmetic	Penn World Table 10.0 (Feenstra, Inklaar & Timmer, 2015)
	GDP per capita (log)	Geometric	
Inclusion	Gini Coefficient (Income Based)	Arithmetic	Global Consumption and Income Project (Lahoti, Jayadev & Reddy, 2016)
	Palma Ratio	Arithmetic	
	Poverty Headcount Ratio 4.16(USD) (2005 PPP)	Arithmetic	
Transformation	Agriculture Gross Value-Added (log)	Geometric	Groningen Growth and Development Centre (Timmer, M., P., de Vries, G., J., & de Vries, K., 2015)
	Agriculture Employment Percentage	Geometric	
	Industry Gross Value-Added (log)	Geometric	
	Industry Employment Percentage	Geometric	
	Services Gross Value-Added (log)	Geometric	
	Services Employment Percentage	Geometric	
Autonomy	Inflation	Arithmetic	World Bank (2021a)
	CBI Index	Arithmetic	Garriga (2016)
Accountability	Human Capital Ratio	Arithmetic	PWT 10.0 (Feenstra, Inklaar & Timmer, 2015)
	Military Expenditure %GDP	Geometric	Stockholm International Peace Research Institute (SIPRI, 2020)
	Under 5's Mortality Rate	Arithmetic	World Bank (2021b)
Social Stability	Civil Violence	Arithmetic	Institute of Systemic Peace (Marshall, 2019)
	Border Country Violence	Arithmetic	

Geometric mean treatments were used when percentage measures were involved, and arithmetic means used when other measures were present.

Appendix B1 - Figures

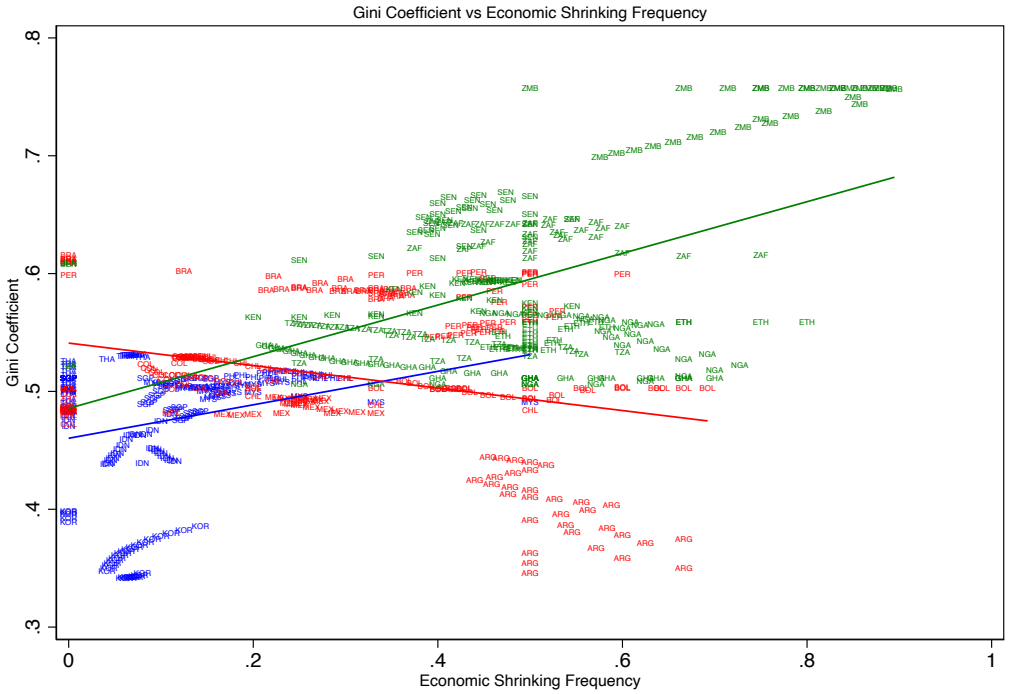

Figure 13: Regional Economic Shrinking Frequency Ratio vs Gini Coefficient (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

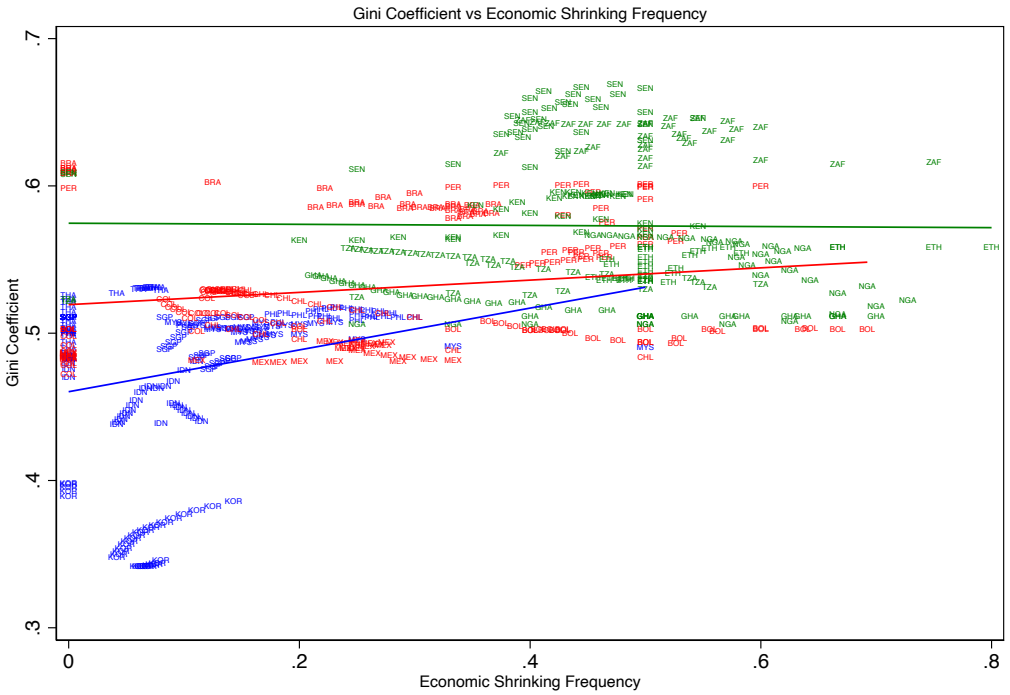

Figure 14: Regional Economic Shrinking Frequency Ratio vs Gini Coefficient with Country Restrictions (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

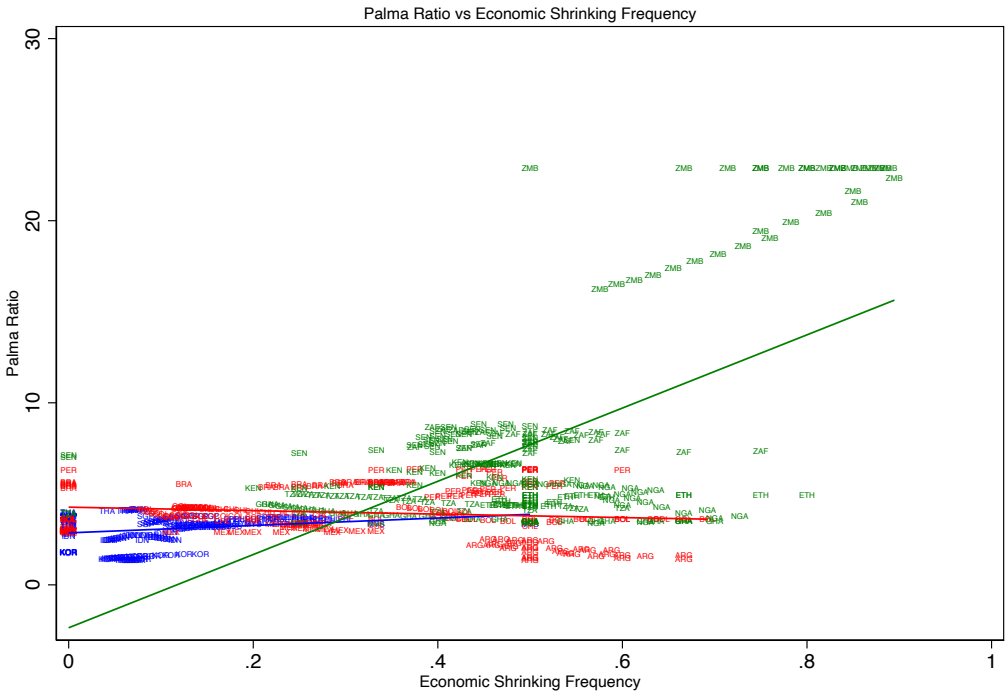

Figure 15: Regional Economic Shrinking Frequency Ratio vs Palma Ratio (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

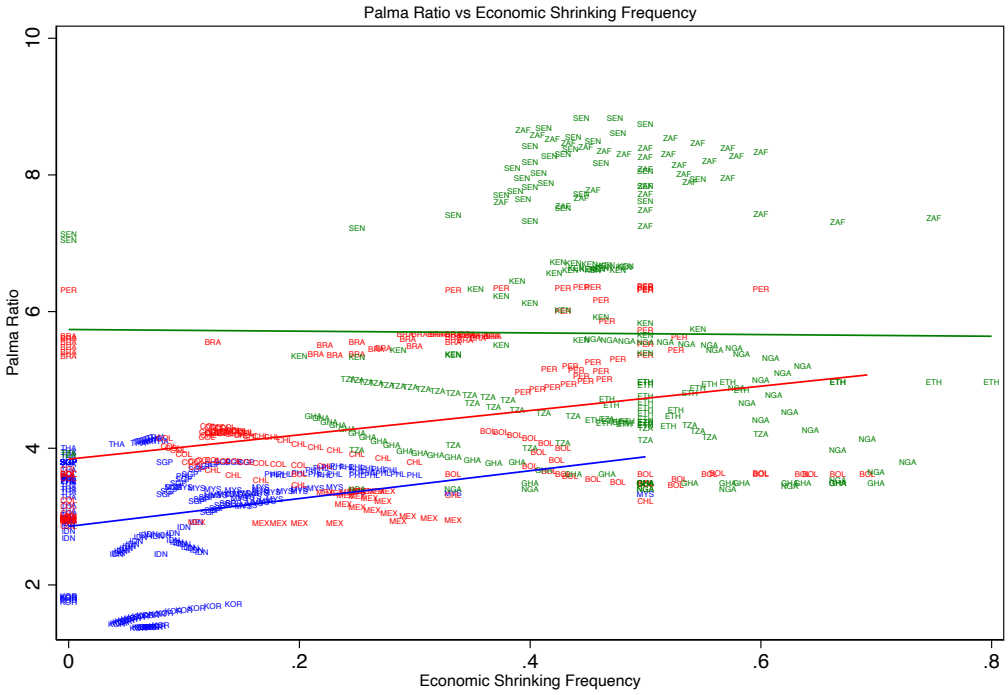

Figure 16: Regional Economic Shrinking Frequency Ratio vs Palma Ratio with Country Restrictions (Authors Calculation's, for summary of data sources see Appendix A2: Table 9).

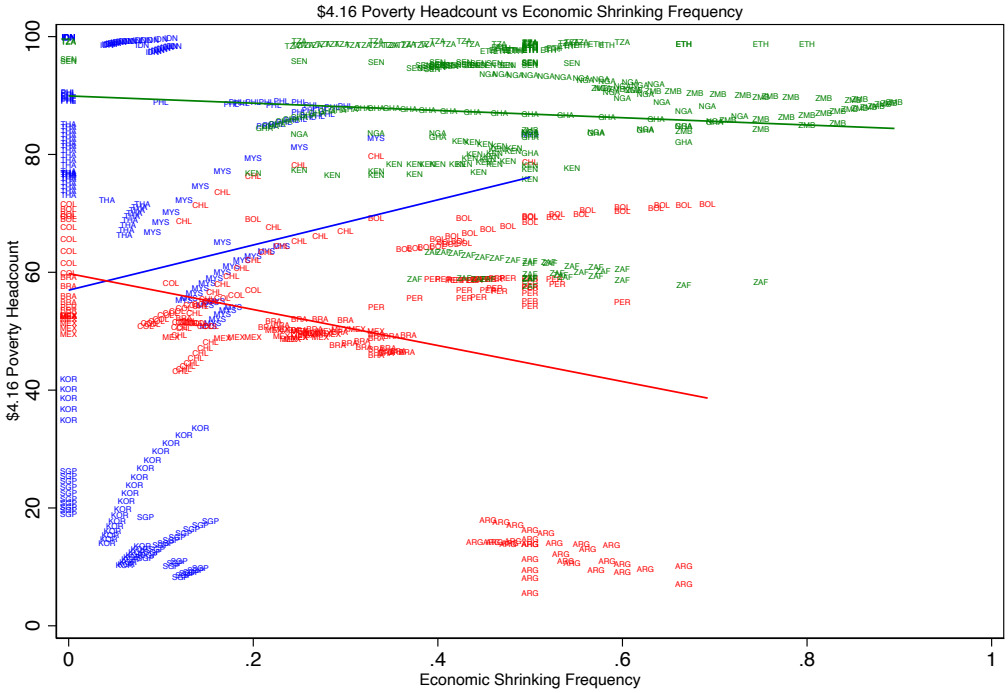

Figure 17: Regional Economic Shrinking Frequency Ratio vs $4.16 per day Poverty Line Headcount (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

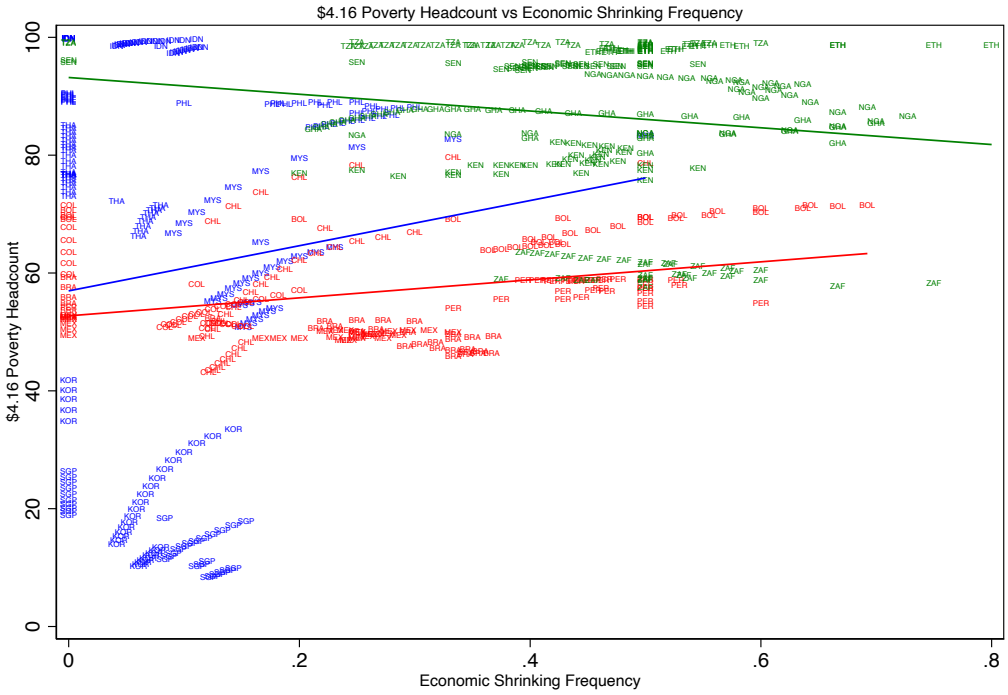

Figure 18: Regional Economic Shrinking Frequency Ratio vs $4.16 per day Poverty Line Headcount with Country Restrictions (Author's Calculations, for summary of data sources see Appendix A2: Table 9).

Appendix B2 - Tables

Table 10: Economic Shrinking Frequency Ratio with Gini Coefficient for East Asian countries (Author's Calculations).

	Economic Shrinking Frequency Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
Gini Coefficient	**0.361*** **	0.962	0.780	-0.603	-0.219	-0.587
	(0.113)	(0.746)	(0.764)	(0.905)	(1.247)	(0.912)
GDP per capita (log)	0.0115	**0.328***	**0.245***	-0.584	-0.588	0.798
	(0.00921)	(0.160)	(0.110)	(0.506)	(0.485)	(0.547)
Agriculture VA (log)		**0.198****	0.0992	-0.218	-0.223	-0.216
		(0.0685)	(0.0981)	(0.164)	(0.176)	(0.191)
Agriculture Emp. %		**0.0536***	0.0371	0.0220	0.0225	0.0797
		(0.0255)	(0.0198)	(0.0335)	(0.0482)	(0.0505)
Industry VA (log)		-0.115	-0.0690	0.472	0.467	-0.707
		(0.0731)	(0.0825)	(0.308)	(0.316)	(0.549)
Industry Emp. %		0.0388	0.0303	0.0239	0.0288	**0.113***
		(0.0237)	(0.0183)	(0.0394)	(0.0592)	(0.0645)
Services VA (log)		**-0.0601***	-0.0147	-0.278	-0.263	**-0.939*****
		(0.0275)	(0.0239)	(0.165)	(0.162)	(0.109)
Services Emp. %		**0.0719****	0.0439	0.0172	0.0194	0.0959
		(0.0280)	(0.0281)	(0.0329)	(0.0521)	(0.0566)
CBI			0.411	-0.674	-0.672	-0.221
			(0.257)	(0.722)	(0.636)	(0.364)
Inflation			-0.000778	0.00567	0.00956	**0.0288*****
			(0.00338)	(0.00538)	(0.00639)	(0.00243)
Human Capital Ratio				**0.491***	0.564	**1.053****
				(0.236)	(0.301)	(0.485)
Under 5's Mortality Rate				-0.00591	-0.00536	-0.00359
				(0.00474)	(0.00530)	(0.00366)
Military Expenditure %GDP				-0.0369	-0.0377	-0.0274
				(0.0349)	(0.0409)	(0.0165)
Total Domestic Civil MEPV					**0.0102***	0.00494
					(0.00497)	(0.00897)
Total Border States MEPV					0.0181	**-0.0433*****
					(0.0216)	(0.0106)
Fixed-Effects with Driscoll-Kraay Standard Errors						x
Observations	192	191	191	190	190	190
Adjusted/Within R-squared	0.050	0.530	0.574	0.693	0.703	0.867

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 11: Economic Shrinking Frequency Ratio with Palma Ratio for East Asian countries (Author's Calculations).

	Economic Shrinking Frequency Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
Palma Ratio	**0.0239*** **	0.0322	0.0257	-0.0410	-0.0177	-0.000880
	(0.00784)	(0.0275)	(0.0187)	(0.0441)	(0.0773)	(0.0574)
GDP per capita (log)	0.00878	0.277	**0.197** **	-0.592	-0.585	**1.014** *
	(0.00929)	(0.142)	(0.0652)	(0.458)	(0.437)	(0.524)
Agriculture VA (log)		**0.169** **	0.0691	-0.218	-0.220	-0.245
		(0.0501)	(0.0688)	(0.144)	(0.146)	(0.178)
Agriculture Emp. %		0.0473	**0.0312** *	0.0228	0.0215	0.0826
		(0.0249)	(0.0139)	(0.0309)	(0.0477)	(0.0533)
Industry VA (log)		-0.0775	-0.0362	0.480	0.468	-0.942
		(0.0470)	(0.0484)	(0.286)	(0.289)	(0.572)
Industry Emp. %		0.0327	0.0252	0.0233	0.0264	**0.118** *
		(0.0244)	(0.0146)	(0.0381)	(0.0632)	(0.0690)
Services VA (log)		**-0.0768** **	-0.0245	-0.285	-0.266	**-0.939*** **
		(0.0209)	(0.0242)	(0.158)	(0.160)	(0.112)
Services Emp. %		**0.0640** *	0.0358	0.0189	0.0186	0.0999
		(0.0258)	(0.0197)	(0.0294)	(0.0497)	(0.0607)
CBI			0.443	-0.715	-0.688	-0.345
			(0.234)	(0.716)	(0.651)	(0.385)
Inflation			-0.000977	0.00580	0.00922	**0.0287*** **
			(0.00327)	(0.00531)	(0.00589)	(0.00281)
Human Capital Ratio				**0.506** *	0.552	**1.244** **
				(0.240)	(0.311)	(0.478)
Under 5's Mortality Rate				-0.00615	-0.00564	-0.00402
				(0.00450)	(0.00578)	(0.00367)
Military Expenditure %GDP				-0.0369	-0.0361	**-0.0271** *
				(0.0342)	(0.0432)	(0.0149)
Total Domestic Civil MEPV					0.00991	0.00203
					(0.00550)	(0.00954)
Total Border States MEPV					0.0153	**-0.0435*** **
					(0.0289)	(0.0118)
Fixed-Effects with Driscoll-Kraay Standard Errors						x
Observations	192	191	191	190	190	190
Adjusted/Within R-squared	0.045	0.508	0.560	0.700	0.704	0.865

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 12: Economic Shrinking Frequency Ratio with $4.16 per day Poverty Line Headcount for East Asian countries (Author's Calculations).

	Economic Shrinking Frequency Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
$4.16 Poverty Line	**0.00180*** **	0.00319	0.00149	-0.00397	-0.000436	**0.0164*** **
	(0.000349)	(0.00241)	(0.00258)	(0.00681)	(0.00834)	(0.00231)
GDP per capita (log)	**0.0867*** **	**0.327***	0.228	-0.492	-0.541	**0.776*** **
	(0.0170)	(0.139)	(0.125)	(0.330)	(0.299)	(0.278)
Agriculture VA (log)		**0.172****	0.0764	**-0.169***	**-0.201***	**-0.294***
		(0.0441)	(0.0975)	(0.0811)	(0.0854)	(0.161)
Agriculture Emp. %		0.0383	**0.0257***	0.0453	0.0280	**0.154*** **
		(0.0221)	(0.0121)	(0.0431)	(0.0351)	(0.0378)
Industry VA (log)		-0.147	-0.0652	0.430	**0.437****	-0.378
		(0.0806)	(0.113)	(0.218)	(0.169)	(0.296)
Industry Emp. %		0.0281	0.0197	0.0448	0.0343	**0.220*** **
		(0.0214)	(0.0154)	(0.0455)	(0.0405)	(0.0496)
Services VA (log)		-0.0151	-0.00692	-0.274	**-0.251****	**-0.778*** **
		(0.0590)	(0.0345)	(0.143)	(0.0935)	(0.132)
Services Emp. %		**0.0546***	0.0315	0.0403	0.0256	**0.208*** **
		(0.0215)	(0.0168)	(0.0376)	(0.0311)	(0.0442)
CBI			0.386	-0.388	-0.617	-0.372
			(0.338)	(0.521)	(0.777)	(0.224)
Inflation			-6.85e-05	0.00399	0.00931	**0.0257*** **
			(0.00439)	(0.00454)	(0.00632)	(0.00333)
Human Capital Ratio				**0.382***	0.549	0.387
				(0.167)	(0.398)	(0.393)
Under 5's Mortality Rate				-0.00501	**-0.00487***	0.00436
				(0.00301)	(0.00194)	(0.00290)
Military Expenditure %GDP				-0.0588	-0.0395	-0.00740
				(0.0726)	(0.0652)	(0.0152)
Total Domestic Civil MEPV					0.0105	0.000699
					(0.0116)	(0.00778)
Total Border States MEPV					0.0195	**-0.0267*** **
					(0.0166)	(0.00948)
Fixed-Effects with Driscoll-Kraay Standard Errors						x
Observations	192	191	191	190	190	190
Adjusted/Within R-squared	0.121	0.520	0.555	0.691	0.703	0.890

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 13: Economic Shrinking Frequency Ratio with Gini Coefficient for Latin American countries (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Coefficient	**-1.012*** **	**-0.829***	-1.772	**-2.522****	-1.166	**6.434*** **	**3.690****
	(0.226)	(0.372)	(1.007)	(0.890)	(0.685)	(2.165)	(1.490)
GDP per capita (log)	-0.0328	**0.271*** **	**0.282*** **	**0.850*** **	**0.721*** **	**-5.201*** **	**-2.813****
	(0.0339)	(0.0547)	(0.0395)	(0.172)	(0.192)	(1.026)	(1.047)
Agriculture VA (log)		**0.346*** **	0.173	0.211	**0.227***	**2.893*** **	**2.278****
		(0.0530)	(0.143)	(0.154)	(0.116)	(0.674)	(0.850)
Agriculture Emp. %		0.0623	0.0271	-0.0605	-0.0714	**0.335****	**0.302****
		(0.0378)	(0.0400)	(0.0529)	(0.0474)	(0.135)	(0.119)
Industry VA (log)		**-1.542*** **	**-1.209*** **	**-1.328***	-1.096	**1.308*** **	0.403
		(0.138)	(0.264)	(0.592)	(0.720)	(0.468)	(0.547)
Industry Emp. %		**0.0980****	0.0448	-0.0677	-0.0669	**0.423*** **	**0.423*** **
		(0.0340)	(0.0463)	(0.0765)	(0.0692)	(0.140)	(0.116)
Services VA (log)		**1.157*** **	**0.988*** **	**1.102***	0.845	**2.292*** **	0.0581
		(0.111)	(0.166)	(0.503)	(0.634)	(0.682)	(0.786)
Services Emp. %		**0.0745***	0.0403	-0.0569	-0.0590	**0.545*** **	**0.466*** **
		(0.0373)	(0.0405)	(0.0667)	(0.0542)	(0.171)	(0.139)
CBI			-0.254	**-0.688***	**-1.239****	**-0.807****	-0.0510
			(0.214)	(0.352)	(0.449)	(0.383)	(0.544)
Inflation			**0.000364***	**0.000535***	0.000242	-0.000226	0.000487
			(0.000156)	(0.000275)	(0.000333)	(0.000258)	(0.000459)
Human Capital Ratio				0.325	**0.622***	-1.119	-1.495
				(0.197)	(0.292)	(0.723)	(1.278)
Under 5's Mortality Rate				0.00218	0.00400	**0.0123*** **	**0.0150****
				(0.00390)	(0.00313)	(0.00370)	(0.00610)
Military Expenditure %GDP				**0.0633***	0.0496	**0.116****	0.0892
				(0.0300)	(0.0281)	(0.0555)	(0.0873)
Total Domestic Civil MEPV					**0.0631****	-0.0239	**-0.119****
					(0.0235)	(0.0200)	(0.0529)
Total Border States MEPV					0.0782	**-0.237****	**-0.242*** **
					(0.0502)	(0.0905)	(0.0799)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	224	224	224	224	224	224	192
Adjusted/Within R-squared	0.082	0.761	0.783	0.822	0.842	0.771	0.822

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 14: Economic Shrinking Frequency Ratio with Palma Ratio for Latin American countries (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Palma Ratio	-0.0183	-0.0269	-0.0567	**-0.157****	-0.0978	-0.0315	**-0.206*****
	(0.0111)	(0.0260)	(0.0482)	(0.0601)	(0.0583)	(0.0343)	(0.0322)
GDP per capita (log)	0.0135	**0.271****	**0.294****	**1.023*****	**0.844****	**-2.008****	**1.738****
	(0.0350)	(0.0862)	(0.0804)	(0.170)	(0.258)	(0.767)	(0.840)
Agriculture VA (log)		**0.392*****	**0.285****	**0.304****	**0.249****	**1.459****	1.006
		(0.0594)	(0.112)	(0.112)	(0.0845)	(0.538)	(0.808)
Agriculture Emp. %		0.0702	0.0503	**-0.0866****	**-0.100****	0.170	0.0111
		(0.0462)	(0.0451)	(0.0347)	(0.0339)	(0.154)	(0.111)
Industry VA (log)		**-1.640*****	**-1.459*****	**-1.766****	-1.304	-0.151	**-1.938*****
		(0.179)	(0.282)	(0.505)	(0.725)	(0.426)	(0.550)
Industry Emp. %		**0.111****	0.0788	-0.0855	**-0.0961***	0.203	0.0850
		(0.0416)	(0.0475)	(0.0474)	(0.0461)	(0.145)	(0.106)
Services VA (log)		**1.209*****	**1.127*****	**1.446****	1.027	**1.758****	-0.915
		(0.162)	(0.242)	(0.466)	(0.668)	(0.781)	(0.916)
Services Emp. %		0.0836	0.0651	**-0.0764***	**-0.0848***	0.255	0.0229
		(0.0465)	(0.0469)	(0.0357)	(0.0369)	(0.175)	(0.132)
CBI			-0.174	**-0.472***	**-1.080****	-0.0955	**0.930****
			(0.217)	(0.235)	(0.359)	(0.417)	(0.451)
Inflation			0.000334	0.000439	0.000208	0.000102	**0.00108****
			(0.000194)	(0.000323)	(0.000307)	(0.000276)	(0.000429)
Human Capital Ratio				0.0492	0.397	0.244	1.412
				(0.292)	(0.287)	(0.717)	(1.151)
Under 5's Mortality Rate				0.00272	0.00406	**0.0132****	**0.0196*****
				(0.00330)	(0.00246)	(0.00633)	(0.00684)
Military Expenditure %GDP				**0.0914*****	**0.0736****	**0.144*****	**0.171****
				(0.0207)	(0.0283)	(0.0518)	(0.0829)
Total Domestic Civil MEPV					**0.0604****	-0.0182	-0.0851
					(0.0243)	(0.0220)	(0.0606)
Total Border States MEPV					0.0788	-0.118	-0.0412
					(0.0591)	(0.113)	(0.0991)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	224	224	224	224	224	224	192
Adjusted/Within R-squared	0.011	0.757	0.771	0.827	0.849	0.750	0.839

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 15: Economic Shrinking Frequency Ratio with $4.16 per day Poverty Line Headcount for Latin American countries (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$4.16 Poverty Line	**-0.00961*** **	0.00587	0.00546	0.00605	0.00618	-4.53e-05	**0.0179** **
	(0.00119)	(0.00759)	(0.00846)	(0.00775)	(0.00543)	(0.00756)	(0.00660)
GDP per capita (log)	**-0.313*** **	0.481	0.439	0.958	**0.884***	**-2.367** **	1.190
	(0.0517)	(0.370)	(0.403)	(0.541)	(0.418)	(0.976)	(1.269)
Agriculture VA (log)		**0.494*** **	**0.453** **	**0.558** **	**0.413***	**1.595** **	**1.675***
		(0.0897)	(0.147)	(0.169)	(0.202)	(0.583)	(0.874)
Agriculture Emp. %		0.106	0.0879	0.0616	-0.0152	0.194	0.130
		(0.0703)	(0.0816)	(0.0714)	(0.0581)	(0.156)	(0.133)
Industry VA (log)		**-1.683*** **	**-1.541** **	**-1.912** **	-1.322	0.0210	**-1.039***
		(0.238)	(0.439)	(0.717)	(0.852)	(0.342)	(0.558)
Industry Emp. %		**0.150***	0.128	0.0958	0.0103	0.233	0.188
		(0.0673)	(0.0872)	(0.0951)	(0.0831)	(0.161)	(0.133)
Services VA (log)		**1.143*** **	**1.041** **	**1.347***	0.877	**1.734** **	-0.860
		(0.170)	(0.299)	(0.587)	(0.674)	(0.775)	(0.984)
Services Emp. %		0.125	0.108	0.0825	0.0127	0.291	0.173
		(0.0787)	(0.0935)	(0.0945)	(0.0699)	(0.186)	(0.167)
CBI			-0.0709	-0.602	**-1.301*** **	-0.138	0.493
			(0.172)	(0.326)	(0.306)	(0.415)	(0.442)
Inflation			0.000177	0.000256	-6.51e-05	6.09e-05	0.000755
			(0.000276)	(0.000454)	(0.000460)	(0.000310)	(0.000478)
Human Capital Ratio				0.426	**0.629** **	0.0338	-0.412
				(0.260)	(0.201)	(0.623)	(1.204)
Under 5's Mortality Rate				0.00376	**0.00505***	**0.0136** **	0.00797
				(0.00419)	(0.00248)	(0.00525)	(0.00596)
Military Expenditure %GDP				0.0278	0.0394	**0.137** **	0.106
				(0.0369)	(0.0220)	(0.0537)	(0.0905)
Total Domestic Civil MEPV					**0.0794*** **	-0.0217	-0.0709
					(0.0129)	(0.0263)	(0.0623)
Total Border States MEPV					**0.104***	-0.134	-0.129
					(0.0491)	(0.103)	(0.113)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	224	224	224	224	224	224	192
Adjusted/Within R-squared	0.226	0.762	0.765	0.796	0.845	0.749	0.824

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 16: Economic Shrinking Frequency Ratio with Gini Coefficient for Sub-Saharan Africa countries (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gini Coefficient	**1.159*** **	**1.681*** **	**1.671*** **	**2.444*** **	**1.495** **	0.488	**8.118*** **
	(0.129)	(0.263)	(0.230)	(0.266)	(0.488)	(0.938)	(2.344)
GDP per capita (log)	-0.0122	-0.118	-0.0458	0.0839	-0.0246	-0.442	**2.050***
	(0.0124)	(0.0657)	(0.0598)	(0.0568)	(0.0954)	(0.650)	(1.135)
Agriculture VA (log)		-0.0542	-0.0919	-0.183	**-0.328** **	-0.524	**-2.714*** **
		(0.218)	(0.126)	(0.127)	(0.124)	(0.601)	(0.762)
Agriculture Emp. %		**-0.0733***	**-0.0977*** **	**-0.227*** **	**-0.119*** **	-0.0698	-0.0113
		(0.0312)	(0.0260)	(0.0528)	(0.0296)	(0.0540)	(0.0355)
Industry VA (log)		**0.232** **	0.200	0.201	**0.184** **	**0.478***	**-0.998***
		(0.0864)	(0.127)	(0.111)	(0.0710)	(0.278)	(0.569)
Industry Emp. %		**-0.0690***	**-0.113*** **	**-0.253*** **	**-0.142*** **	-0.0726	0.0347
		(0.0327)	(0.0274)	(0.0604)	(0.0305)	(0.0768)	(0.0456)
Services VA (log)		**-0.210***	-0.138	-0.0596	0.0861	-0.0782	**-1.168** **
		(0.0944)	(0.0905)	(0.0756)	(0.108)	(0.237)	(0.480)
Services Emp. %		**-0.0819** **	**-0.108*** **	**-0.248*** **	**-0.125*** **	-0.0718	-0.0351
		(0.0335)	(0.0299)	(0.0575)	(0.0334)	(0.0525)	(0.0369)
CBI			-2.212	**-4.033** **	-2.184	-1.406	-1.648
			(1.467)	(1.569)	(1.159)	(1.323)	(1.653)
Inflation			**-0.00335*** **	0.00245	**0.00702** **	0.00188	-0.00638
			(0.000836)	(0.00190)	(0.00205)	(0.00495)	(0.00527)
Human Capital Ratio				**-0.629** **	**-0.664*** **	-0.314	**-0.604***
				(0.226)	(0.149)	(0.327)	(0.318)
Under 5's Mortality Rate				-0.000820	0.000998	0.00378	0.00376
				(0.000982)	(0.00101)	(0.00329)	(0.00279)
Military Expenditure %GDP				0.00737	-0.00360	-0.00776	**0.0606** **
				(0.0144)	(0.0154)	(0.0280)	(0.0261)
Total Domestic Civil MEPV					0.0149	0.0422	**0.116*** **
					(0.0206)	(0.0374)	(0.0324)
Total Border States MEPV					**0.0416***	0.0133	**0.0627*** **
					(0.0184)	(0.0157)	(0.0204)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	256	256	222	207	207	207	185
Adjusted/Within R-squared	0.243	0.555	0.683	0.801	0.830	0.725	0.773

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 17: Economic Shrinking Frequency Ratio with Palma Ratio for Sub-Saharan Africa countries (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Palma Ratio	**0.0182*** **	**0.0198*** **	**0.0172** **	**0.0327*** **	**0.0201** **	-0.00656	**0.236*** **
	(0.00153)	(0.00341)	(0.00513)	(0.00374)	(0.00575)	(0.0192)	(0.0729)
GDP per capita (log)	7.09e-05	-0.0793	-0.0618	**0.185** **	0.0465	-0.0479	**2.118** *
	(0.0111)	(0.0719)	(0.108)	(0.0535)	(0.0867)	(0.774)	(1.161)
Agriculture VA (log)		0.0371	-0.158	-0.0237	-0.229	-0.710	**-2.628*** **
		(0.247)	(0.246)	(0.145)	(0.139)	(0.755)	(0.791)
Agriculture Emp. %		-0.0509	**-0.0769** *	**-0.214*** **	**-0.110*** **	-0.0823	-0.0180
		(0.0291)	(0.0334)	(0.0538)	(0.0268)	(0.0523)	(0.0289)
Industry VA (log)		0.0953	0.178	-0.0145	0.0548	0.401	**-1.113** *
		(0.113)	(0.219)	(0.122)	(0.0899)	(0.260)	(0.579)
Industry Emp. %		-0.0419	**-0.0946** **	**-0.230*** **	**-0.126*** **	-0.0915	0.0335
		(0.0351)	(0.0341)	(0.0609)	(0.0277)	(0.0755)	(0.0415)
Services VA (log)		-0.136	-0.0542	0.0400	0.143	0.0166	**-1.235** **
		(0.0900)	(0.0937)	(0.0606)	(0.0768)	(0.238)	(0.527)
Services Emp. %		-0.0533	**-0.0826** *	**-0.228*** **	**-0.112*** **	**-0.0905** *	-0.0371
		(0.0317)	(0.0385)	(0.0597)	(0.0287)	(0.0526)	(0.0297)
CBI			-1.625	**-4.130** **	**-2.176** *	-1.116	-1.239
			(1.930)	(1.536)	(1.139)	(1.258)	(1.474)
Inflation			**-0.00347** **	0.00235	**0.00716** **	0.00132	-0.00656
			(0.00121)	(0.00223)	(0.00215)	(0.00510)	(0.00525)
Human Capital Ratio				**-0.698** **	**-0.703*** **	-0.433	-0.440
				(0.238)	(0.149)	(0.307)	(0.278)
Under 5's Mortality Rate				-0.000685	0.00109	0.00387	0.00151
				(0.000964)	(0.000952)	(0.00346)	(0.00232)
Military Expenditure %GDP				0.00676	-0.00542	-0.0207	**0.0520** *
				(0.0174)	(0.0169)	(0.0278)	(0.0256)
Total Domestic Civil MEPV					0.0187	0.0506	**0.112*** **
					(0.0188)	(0.0382)	(0.0317)
Total Border States MEPV					**0.0413** **	0.0182	**0.0611*** **
					(0.0147)	(0.0165)	(0.0215)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	256	256	222	207	207	207	185
Adjusted/Within R-squared	0.361	0.514	0.649	0.799	0.831	0.725	0.777

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.

Table 18: Economic Shrinking Frequency Ratio with $4.16 per day Poverty Line Headcount for Sub-Saharan Africa countries (Author's Calculations).

	Economic Shrinking Frequency Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$4.16 Poverty Line	0.000111	**-0.0110***	**0.0134***	-0.00693	0.00206	**-0.0357***	-0.0104
	(0.00190)	(0.00560)	(0.00688)	(0.0178)	(0.0115)	(0.0193)	(0.0231)
GDP per capita (log)	0.0223	**-0.429****	-0.0598	-0.214	-0.128	-0.871	0.216
	(0.0307)	(0.133)	(0.152)	(0.303)	(0.286)	(0.630)	(1.202)
Agriculture VA (log)		-0.333	**-1.016*****	**-1.143****	**-0.779*****	-0.880	-1.324
		(0.334)	(0.235)	(0.369)	(0.193)	(0.531)	(0.863)
Agriculture Emp. %		-0.00782	**-0.141*****	**-0.253*****	**-0.0612***	**-0.0823***	-0.0507
		(0.0711)	(0.0313)	(0.0328)	(0.0280)	(0.0468)	(0.0550)
Industry VA (log)		0.272	**0.775*****	**0.682****	**0.361****	0.289	0.0723
		(0.199)	(0.155)	(0.218)	(0.141)	(0.300)	(0.309)
Industry Emp. %		-0.0298	**-0.209*****	**-0.335*****	**-0.103****	-0.0798	-0.0460
		(0.0714)	(0.0448)	(0.0502)	(0.0425)	(0.0676)	(0.0745)
Services VA (log)		0.0141	0.0380	**0.267***	**0.289****	-0.192	-0.217
		(0.119)	(0.107)	(0.138)	(0.102)	(0.350)	(0.370)
Services Emp. %		-0.00135	**-0.169*****	**-0.282*****	**-0.0612***	**-0.0939****	-0.0647
		(0.0808)	(0.0380)	(0.0294)	(0.0312)	(0.0452)	(0.0538)
CBI			-1.086	-2.122	-0.558	-0.153	0.925
			(1.495)	(1.842)	(0.833)	(1.129)	(1.459)
Inflation			**-0.00650***	-0.00172	**0.00801****	-0.00247	-0.00230
			(0.00277)	(0.00484)	(0.00265)	(0.00552)	(0.00577)
Human Capital Ratio				-0.305	**-0.573*****	**-0.659***	-0.534
				(0.241)	(0.140)	(0.357)	(0.347)
Under 5's Mortality Rate				0.00271	**0.00314*****	**0.00877***	0.00479
				(0.00195)	(0.000883)	(0.00504)	(0.00446)
Military Expenditure %GDP				-0.0333	-0.0212	-0.0118	-0.0169
				(0.0267)	(0.0177)	(0.0186)	(0.0214)
Total Domestic Civil MEPV					0.0264	0.0320	0.0634
					(0.0362)	(0.0332)	(0.0459)
Total Border States MEPV					**0.0698*****	0.0223	**0.0423***
					(0.0127)	(0.0181)	(0.0214)
Fixed-Effects with Driscoll-Kraay Standard Errors						x	x
Country Restriction							x
Observations	256	256	222	207	207	207	185
Adjusted/Within R-squared	0.001	0.354	0.602	0.652	0.797	0.740	0.711

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. For summary of data sources see *Appendix A2: Table 9*.