

**DECOMPOSITION AND DYNAMICS OF
INEQUALITY AND ITS RELATION TO TRADE
FACILITATION: A STUDY ON THE
PHILIPPINES**

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PHILIPPINES**

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ABSTRACT

This paper is divided into three parts. First, it revisits how inequality in the Philippines has moved in the past two decades. Inequality decomposition was performed from 1994 to 2012, and results indicate that inequality in the Philippines has been declining since 1997, albeit at a very slow pace. Both between-groups and within-groups differences are deemed important drivers of inequality through time. For between-groups differences, educational attainment of household heads explains most of the disparity in economic outcomes. This is followed by difference in urbanity—although this driver is diminishing in importance. Meanwhile, Gini decompositions indicate that income sources have varying impacts on inequality. Improving agricultural and entrepreneurial incomes are found to reduce inequality for both urban and rural areas, while augmenting salary income can potentially lower inequality, but only in urban areas.

Second, the paper confirms how present inequality outcomes affect future inequality and income through a system GMM estimation following Kurita and Kurosaki (2011) on Philippine household data from 1985 to 2012. Regions with higher income inequality are ruled to expect lower inequality in the future, suggesting income distribution convergence. Meanwhile, higher inequality is noted to depress consumption, and consequently, incomes in future periods, which corresponds to the “low growth trap” effect that impedes development.

Third, fixed effects regressions were employed to establish the relationship between improved trade facilitation, as measured by infrastructure development, and inequality in the Philippines. Evidence indicates that improved connectivity of a region to domestic and international markets does affect inequality. Improved road networks, which capture the connectivity of regions to the domestic markets, were found to have negative association with inequality. Meanwhile, seaports capacity and quality that represents connectivity of regions to foreign markets yields a positive association with inequality.

Keywords: Inequality; Trade Facilitation; Trade Infrastructure; Decomposition of Inequality

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THESIS OUTLINE

Section 1 serves as the Introduction of the work, where the general research questions of the study are framed. In particular, the problem of inequality and how trade affects inequality across countries is discussed.

Section 2 looks at related literatures on inequality movements in the country of interest—the Philippines. Section 2 discusses how the Philippines evolved through time along with the process of trade liberalization and local infrastructure development. Moreover, studies on how trade and trade facilitation can be related to inequality are presented.

Section 3 discusses the theoretical underpinnings of trade facilitation and how it is related to inequality. Further, Section 3 explores the theories that explain the relationship of location differences and inequality.

Section 4 presents the Data and Methodology used in the paper. The Data section presents the Family Income and Expenditure Survey, the infrastructure indicators and the data transformations made before proceeding to the analyses. Meanwhile, the Methodology section explains how inequality is measured and decomposed, and how inequality dynamics are observed. Further, the association between inequality outcomes and trade facilitation is determined.

Section 5 is the formal presentation of the results of the decomposition of inequality and the regression analyses conducted to answer the research question presented in Section 1.

Lastly, in Section 6 a conclusion is drawn from the results obtained in Section 5. Moreover, the paper presents policy recommendations that aim to improve trade facilitation in the country and how trade facilitation can be used as an instrument to address inequality.

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1. INTRODUCTION

This paper aims to revisit the state of inequality in the Philippines. With the availability of new data, it is helpful to look back at past issues concerning inequality by examining how recent outcomes are different from the past episodes. This will allow us to assess whether previous problems were addressed or have persisted, despite economic policies installed in response to a social and economic dilemmas like income inequality.

New and old inequality researches almost always go back to Simon Kuznets' seminal work on income inequality and its relationship with economic growth. Kuznets predicted that countries, particularly those in their nascent stages of development, would see their economy grow over time but will, concomitantly, experience an increase in inequality. He also maintained that inequality would reach a peak and soon decline as the economy matures and economic growth continues—hence, the Kuznets' curve (Kuznets 1955).

Empirical evidence has shown that the Kuznets curve is observable in various regions of the world: from the European experience (Williamson 1985), (Van Zanden 1995), to Asia (Oshima 1993).

The Philippines on the other hand diverged from its Asian counterparts, tallying dismal records in terms of inequality levels and changes for a significant amount of time (J. P. Estudillo 1997);(Estudillo, Quisumbing and Otsuka 2001);(Balisacan and Fuwa 2004). This is in spite of deliberately putting forward development plans that aim to ameliorate income disparity in the country since the 1950s (Balisacan 2003).

Over the years, dissenting views emerged as to how income inequality affects a country, particularly its economic growth. As described by Ostry, Berg and Tsangarides (2014) and Farole (2013): Greater inequality can potentially support higher growth, if there are enough incentives for investors to put forward more innovations and for entrepreneurs to set up new businesses, thus enhancing the income of the whole economy (Lazear and Rosen 1981). They also noted Kaldor's (1957) contention that some degree of inequality could boost economic growth provided that people in the higher segments of the socio-economic ladder will save and invest most of their income in the domestic economy, which will support over-all savings and investments in the economy.

A prevailing notion also exists, that higher regional inequality might not be inherently bad if viewed through a macro efficiency perspective (Farole 2013). Bourguignon and

Morrison (2002) supported this as they highlighted the positive relationship between geographical concentration of economic activity and economic growth.

On the other end of the idea spectrum, high and persistent inequality in a country is believed to be a bane for economic growth. Inequality affects not only the people in the low-income areas or poorer segments of the society but the rest of the economy. First, it tends to deprive the lower income groups of resources to pay for health services and education, which could stunt the quality of human capital in a nation (Perroti 1996), (Galor and Moav 2004), (Aghion, Caroli and Garcia-Penalosa 1999).

Moreover, persistent income inequality in a country could lead policy makers to overlook the situation in the peripheral areas. Nationwide indicators could shadow the real situation on the sub-national levels, i.e. regions and provinces. That is, when average inequality seems passable at a national level, this may cloud ongoing economic stagnation and ballooning poverty in the sub-national levels, which are not captured by the national indicators (T. Farole, Trade, Location and Growth 2013).

Long-standing disparities among socio-economic groups are also sources of dissatisfaction towards governments. These could eventually threaten political and social cohesion. However, if political dynamics are considered— how politicians need to install populist policies to attract voters. The higher demand for redistributive policies as opposed to the productive policies may dampen over-all growth. Although, this depends on whether output inequality translates to income inequality (Aghion, Alesina and Trebbi, Endogenous Political Institutions 2004).

A gloomier situation can arise if lagging regions are continuously left behind, resulting from their incapacity to make productive use of the resources available to them. If incapacity is coupled with faulty institutions, lagging regions are in danger of falling into the “low growth trap” which can drag the over-all national growth potentials (Farole, Rodriguez-Pose and Storper 2011).

With the recognition of the importance of inequality as a social issue, it becomes helpful to look at factors that are not normally thought to affect inequality, at least in the popular discourse. In the same line of reasoning, certain patterns could be instructive in viewing the story of inequality through a new light. For this paper, the author looks at the relationship of trade, particularly trade facilitation, to inequality.

Following the Trade-Growth nexus, controversies also exist on how trade and inequality are connected. On one hand, trade is seen to have barely affected income inequality

within a country while the national income increases (Dollar and Kraay 2004). On the other hand, trade is deemed as an outright contributor to rising inequality in a country, at least for the developing nations (Barro 2008). Nonetheless, Barro (2008) also maintained that inequality-augmenting effects of trade diminish as the economy matures, and a stage where trade eventually contributes in reducing inequality can be attained. This paper then aims to look at a mechanism that is known to improve the trading process: trade facilitation. It also aims to further examine whether trade facilitation has potential to improve inequality outcomes for the Philippines.

Along with rising economic growth rates observed in the developing world, particularly in Asia, there was an aggressive move of many countries towards trade liberalization, marking the height of international trade. The co-movements of trade liberalization and economic growth across nations have generated a sizable amount of literature explaining the mechanisms of the trade-growth nexus, mostly confirming the existence of a structural and significant relationship between trade and growth. Dollar and Kraay (2004), for example, concluded that the positive trend in trade volumes exhibits a strong positive relationship to growth rates, accounting for within-country variations.

Advocates of trade liberalization have thus recommended gradual reductions in tariff rates to encourage growth among nations and to raise national incomes¹. The reduction or the complete removal of tariffs as trade barriers improve market access in developed countries, which consequently contributes to economic growth (Romalis 2006), David and Kraay (2004). These earlier studies often refer to trade liberalization as the significant reduction or complete removal of tariff rates—a reduction in the direct cost of trading. However, other barriers to trade also exist, barriers that are characterized mostly by the indirect costs incurred during trade. These barriers pertain to poor trade facilitation or trade logistics that may stem from underdeveloped infrastructure and unreliable business logistics, among others.

With the seemingly positive co-movements of trade indicators and economic growth, there is reason to believe that the trading process can also affect welfare variables, such as inequality. Which in turn would be helpful for countries to better understand both economic phenomena, potentially opening doors for countries to become more competitive in international trade and reaping gains for the whole citizenry—a manner of development where benefits are not limited only to the rich but also to those families who occupy the bottom section of the income distribution. In this paper, we assume that trade facilitation can improve trade by reducing non-tariff costs and increasing efficiency in the trading process.

¹ Following the Ricardian Theory that explains that national income tends to increase because trade allows countries to specialize in what it produces most efficiently.

Following the discussions above, this paper revolves around two primary objectives:

1. To describe how inequality in the Philippines has moved in recent years through decomposition analysis, and to determine how previous inequality outcomes affect inequality measures in the present and possibly the future through the dynamic panel regressions; and
2. To ascertain if trade facilitation, through infrastructure development in the country might have effects on inequality in the Philippine.

1.1. SUMMARY OF METHODOLOGY

The study employed Family Income and Expenditure Survey (FIES) data to measure inequality outcomes in the Philippines. The main measures of inequality—such as the Gini coefficients and the Theil indices—were computed and used in the subsequent analyses. To assess changes in inequality over the years, the paper looks into the streams of inequality movements.² Particularly, inequality can be explained by the increasing proportion of urban households; changes in age distribution among households; the rise of highly educated households; and the difference in wages per income source.

After inequality outcomes are derived, a dynamic panel model is specified on a regional level to examine how inequality in the Philippines measured by the Gini coefficient interacts with real variables and controls along with the lag values of inequality and the lag values of consumption measured by the Adult Expenditure equivalence.

Meanwhile, to ascertain whether trade facilitation indeed affects inequality, fixed effects models were defined with the purpose of obtaining the partial effects of infrastructure development—marked by road networks and seaports quality, per region on inequality.

²As described in Estudillo (1997)

1.2. SUMMARY OF RESULTS

Over-all inequality in the Philippines, as measured by the Gini coefficients and the Theil indices, exhibited a slow declining trend over the period of almost two decades, from 1994 to 2012. This is with the exception of the 1997, where inequality increased as the country endured the negative shocks of the Asian Financial Crisis on the international front and a severe droughts and agricultural damages brought by the El Nino phenomenon on the domestic side.

Through inequality decomposition analyses, it was noted that changing patterns and composition in the general population and the shifts in income shares among population sub-groups contributed to how the trends in inequality have progressed. Between-groups differences played a part in explaining income disparity over time. Most notably, disparities in educational attainment contributed the most in the over-all inequality. The urban-rural divide is also observed to contribute to inequality. However it was noted to have diminishing importance through time. Meanwhile, age difference between household heads is found to explain the least of the inequality observed. Most of the over-all inequality observed during the review period, however, stems largely from within-groups inequality.

The difference between income sources is also deemed important in explaining inequality. Based on the Gini coefficient decompositions, improving agricultural income can lower inequality for both urban and rural areas. In terms of major income source, increases in entrepreneurial income in both rural and urban areas can help narrow income disparity. Meanwhile, it is also worth noting that augmenting salary wages is shown to have potentials in lowering inequality in the urban areas but not in the rural areas.

Using the system GMM estimation similar to Kurita and Kurosaki (2011), it is found that from the year 1985 to 2012, there is a structural relationship between inequalities in the country—that is, the effect of previous inequality level can affect future inequality outcomes. Regions with higher income inequality are expected to have lower level of inequality in the future, suggesting a possible convergence in inequality across provinces. The system GMM estimates also showed that inequality in the past periods could negatively affect consumption, and consequently income in the future.

Lastly, trade facilitation variables are then paired with inequality measures, through fixed-effect regressions. Evidence shows statistical significance on how the variation between relative connectivity of the regions to other regions is associated with their respective regional inequality outcomes. Moreover, this is also observed on the relative

connectivity of regions to international market. Further, it was noted that roads networks, which capture internal connectivity, have a negative coefficient to inequality, whilst seaports indicators that capture dual connectivity to foreign markets and domestic markets have a positive association with inequality.

2. REVIEW OF RELATED LITERATURE

2.1. INEQUALITY IN THE PHILIPPINES

The Philippines, along with its Asian counterparts, has exhibited post-war economic growth. However, this growth was accompanied by increased inequality in early stages of development (Oshima 1993). Unfortunately for the Philippines, it faced developmental setbacks on various fronts, most notably backward institutions and the culture of politicking and corruption (Briones 2009). Thus, while other countries in the region grew economically and saw income disparity fizzle out, the Philippines diverged from this Asian success story and become the perennial lagger in performance. This is true not only in terms of lowering income inequality but also in terms of economic growth and poverty reduction. This has been the case despite the Philippine government's efforts to put forward development plans that seek to lower poverty and to curtail the growing disparity amongst sectors of the economy both in the short term and the medium term since the 1950s (Balisacan, Poverty and Inequality 2003).

Many Filipino economists have described this tenacious income disparity in the Philippines throughout the years. First, Estudillo (1997) conducted a comprehensive study on inequality outcomes in the country from years 1961-1991. She noted that the over-all inequality in the country has been firm and stable at elevated levels. Her results were based on inequality decomposition analyses from four trends that drive inequality, namely: (1) the changes of household locations from rural to urban areas, (2) the changing age distribution of household heads, (3) increasing level of educational attainment of household members over time, and (4) the increasing wage inequality.

There are also evidences that the characteristics of inequality can vary according to the level of urbanity of an area. In the case of rural inequality, Estudillo, Otsuka and Quisumbing (2001) looked at the household income structure of rice-growing villages in the Philippines to examine the determinants of rural inequality. They found out that during the post-Green Revolution, non-farm income experienced a structural shift and

diverged significantly, leaving farm income levels behind. They concluded that the income gap between farm and non-income source contributed to the increasing inequality in the rural areas.

Meanwhile, Balisacan and Fuwa (2004) explored how spatial income inequality moved throughout the Philippines from 1985 to 2000. They examined the impact of macroeconomic variations on income inequality and noticed how little macroeconomic outcomes affect inequality on the sub-national levels. They suggested that income distribution and dispersion in the country across different regions has never really converged.

Extending the previous studies conducted in the Philippines, this paper will aim to look at how aggregate inequality has changed from two decades ago, wherein the inequality decomposition will be made for the years 1994 to 2012, with particular focus on the trends employed by Estudillo (1997). Further, to take into account the differences in household composition and inflation, adult-equivalence transformation and real values were obtained prior to analyzing inequality outcomes.

2.2. TRADE FACILITATION

Reduction in the cost of trade and faster goods movements has allowed countries to reap larger gains from trade (Dollar and Kraay 2004), (Ostry, Berg and Tsangarides 2014). Through these improvements, countries are better poised to further promote their citizens' welfare. In this section, trade facilitation and trade logistics along with the empirical studies highlighting the impacts of improved trading are examined, not only to those who are directly involved in the process but to the rest of economy. Moreover, studies pointing towards trade facilitation as an important link between international trade and the economic outcomes on a domestic setting are explored.

Since 1994, the World Trade Organization (WTO) included trade facilitation as an important agenda to be tackled by its member governments. In 2004 the negotiations concerning trade facilitation formally started in the WTO (Duval 2007). The WTO formally defines trade facilitation as *"the simplification and harmonization of international trade procedures"* covering the *"activities, practices and formalities involved in collecting, presenting, communicating and processing data required for the movement*

*of goods in international trade*³”.

According to the WTO, the main goal of trade facilitation is to lower transaction costs and to simplify the process of international trade for businesses. It also aims to promote better trading environment in a country and at the same time allow countries to maintain efficient and effective levels of government control over the process. Further WTO enumerated the main areas of focus for trade facilitation, which include: a) Infrastructure investment; b) Customs modernization and border crossing – environment; c) Streamlining of documentary requirements and information flows; d) Automation and Electronic Data Interchange (EDI); e) Ports efficiency Logistics and transport services: regulation and competitiveness; f) Transit and multimode transport; and g) Transport security (United Nations Economic Commission for Europe 2002). This paper will examine seaports and road networks indicators, which are related to the fifth and sixth focus of trade facilitation.

In a nutshell, the direct impact of enhanced trade facilitation is to improve trade outcomes. Hausmann, Lee and Subramanian (2005) noted that better trade facilitation performance improves the level of bilateral trade between countries. The quality of trade facilitation services varies greatly across countries in Asia and this variation might explain the differences in trade performances of countries (J. Wilson, et al. 2002).

Evidence also suggests that higher trade costs form a significant obstacle to trade and higher non-tariff barriers impede the realization of gains from trade liberalization. Improved infrastructural and logistics services play an important role in the flow of international trade. On one hand, they generate wealth by reducing the costs of trade because of their non-discriminatory and non-rival characteristics; on the other hand, they integrate production and trade across countries (Carruthers and Bajpaj 2002), (Hummels 1999), (Fink, Mattoo and Neaugu 2002).

Moreover, good internal transport system can facilitate surplus commodity shipments from surplus to shortfall regions; this reduces the variability of prices between the two regions. Good internal logistics then provide producing regions protection from scarcity and glut. Better market access appears to dampen price volatility for a broad range of products. Also, the volatility in goods prices between city pairs is seen to increase with the distance between the cities, and is especially large for city pairs across national borders. Essentially, arbitrage is necessary to narrow price differentials across

³United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). (2002). “An Overview of Trade Facilitation”

locations, and this is much harder to achieve when logistics are poor (Engel and Rogers 1996).

Better transport and logistics systems make the timing of delivery more reliable. Producers cannot manufacture goods without the inputs they need, and retailers cannot sell goods they do not have in stock, if delivery times are uncertain, firms must hold large inventories of goods. The inventory holdings in manufacturing are two to five times higher in developing countries than in the United States, and estimate that halving inventories could reduce unit production costs by 20 percent (Gausch and Kogan 2001).

The importance of transport and logistics is illustrated by a study on their impact on Intra-trade among the economies of the Asia Pacific Economic Cooperation (APEC). Intra- APEC trade would increase by an estimated \$280 billion through an improvement of various trade facilitation measures, half of which derived from improvements in port logistics. This represents about a 10% increase from the current level of intra-APEC trade. The study suggests that well-conceived investment in trade facilitation could have high economic payoffs. That is the importance of governments' role in trade facilitation, and their efforts on this should be an integral part of the country development strategy (J. S. Wilson, et al. 2002).

Reducing the cost of trade through better quality of logistics and transport systems improves international market access and leads directly to increased trade. This moderate the prices faced by consumers, which also improve the prices received by producers. This in turn results to higher income and provides a scope for lower income disparity and poverty reduction (Carruthers and Bajpaj 2002).

2.4. TRADE FACILITATION AND INEQUALITY IN DEVELOPING COUNTRIES

Although the literature exploring the trade and poverty nexus has grown considerably, the body of research exploring concrete evidences on the relationship of trade and inequality is still budding. Current researches on trade liberalization mainly explore the contribution of trade liberalization to income convergence or divergence among countries. On the domestic level, there seems to be inconclusive results on whether trade has in indeed contributed to greater income disparity or income convergence within a country's territory.

Nonetheless, following the evidences that suggest how trade facilitation improves a

country's position in international trade, some preliminary researches which looked at the positive impact of trade facilitation on economic growth, poverty alleviation and income distribution are already in place. Some of these studies support the claim that trade helps narrow income disparity gap. This includes Isik-Dikmelik's (2006) analysis on the importance of different channels that link trade reforms and household welfare. Her research focused on Vietnam's case, where she noted that trade reforms have helped improve the citizen's welfare, with larger portion of the gains reaped by those who occupies the lower portion of the income distribution.

There are also considerable number of literature that documented the positive effect of trade facilitation on employment, which in turn links employment generation from trade as an agent of lower inequality and poverty reduction e.g. (McCulloch, Winters and Cirera 2001), (Harrison 2005);(Winters, McCulloch and McKay 2004);(Hoekman and Winters 2005). Hoekman and Winters (2005) even suggested that trade can contribute to higher rate of employment in the economy. They noted that the expansion of export-oriented sectors is able to create opportunities for low skilled workers to gain employment. This contention is supported by studies that found evidence on the positive correlation of trade facilitation with employment (Dennis 2006), (ESCAP 2009), (Zaki 2011).

A direct link between inequality and trade facilitation was explored by Nguyen (2013). He measured trade facilitation, as the time needed to complete exports and imports transactions in a country along with the number of documents required in order for trade to take place in a country. Through GMM-type instruments for trade facilitation, he noted that correlations between poverty, inequality and GDP per capita with the trade facilitation exist for developing economies. He concluded that countries with better trade facilitation are more likely to have lower poverty incidence, lower inequality, and higher per capita GDP as oppose to those with poor quality of trade facilitation.

Meanwhile, De and Raychaudhuri (2013) looked at the impact of trade facilitation on poverty reduction in South Asia. They employed primary survey data from three South Asian countries (namely, Bangladesh, India and Pakistan) and noted that poverty reduction, in the perception of the individuals who works for the trading industry, is highly dependent on the reduction of trade barriers and the improvement of trade facilitation. More importantly, their study highlighted that trading firms believe that the main driver for improvements in income distribution and consequently poverty alleviation is the improvement of physical infrastructures that facilitates trade.

In the case of the Philippines, Sawada and Estudillo (2006) examined the effects of integration to international trade and emigration on poverty in the country from 1985 to 2000. They noted that while both non-transfer and transfer income contributed

significantly to poverty reduction in the Philippines, the impacts of transfer income exceeds that of non-transfer income in importance. Moreover integration to international trade has been instrumental in reducing poverty in the country from the earlier period of their panel, albeit, this showed a reversal after the Asian Financial Crisis. These findings are important as it supports the contention that welfare outcomes in the Philippines do respond to the variation in the trade indicators. That is, if trade were able to explain the reduction in poverty in the Philippines at the review period, there is also reason to believe that the progress achieved owing to trade may have also affected income distributions over time.

2.5. HISTORICAL BACKGROUNDS

2.5.1. TRADE LIBERALIZATION IN THE PHILIPPINES

Mirroring the experience of other developing countries, the Philippines also took a protectionist stance on international trade from the 1950s to the 1970s. The prohibitive policy stance of the country was characterized by severe and the protracted import protection policies adopted by the Philippine government during the 1950s and 1960s. This resulted to major disincentives for export production specifically setting the agriculture sector and labor-intensive industries at a huge disadvantage, which in turn penalized the rest of the Philippine economy as a whole since the country is suppressing the industries where it is deemed to have a comparative advantage⁴.

For the Philippines, trade liberalization took place only in the early 1980s. This is when the government started to lift protective tariff and address the problematic import-licensing systems⁵. The move to reduce tariff and to diminish the disparity in tariffs levels across products were pursued along with the reduction of quantitative restrictions on imports. Bautista and Tecson (2003) highlighted that the Philippines, nonetheless, succeeded in becoming a more open economy at the turn of the century despite the presence of some obstacles encountered in the past two decades, most notably the balance-of-payments crisis in 1980s and the reversals in the gains from the reduction of quantitative restrictions in 1990s.

The openness of the Philippine economy was supported by the decline in the effective rates of protection, where it fell by almost half to 14.4% in 2000 from 29.4% in 1990 (Manasan and Pineda 1999). The dawn of trade liberalization in the Philippines also saw

⁴Tecson and Bautista (2003) "International Dimensions" in *The Philippine Economy: Development, Policies, and Challenges* edited by Balisacan, A., and Hill, H. Ateneo de Manila University Press. Quezon City

⁵Ibid.

the expansion of trade flows in the country. The total Philippine exports grew by 16% during the 1990s compared to a meager export growth of 4% in the 1980. Consequently, the export boom allowed for the Philippines' export share in world markets to increase.

Following the historical development of the Philippines, from being heavily protected to becoming more open to trade—this shift in policy contributed to economic gains over the years. However, it was also during this period that the country tallied elevated inequality. This may suggest that the lowering of tariffs and lifting of trade restrictions could not be easily connected to the changes in inequality.

Nonetheless, we recall that trade is deemed more liberalized if the barriers to commodity exchange are lowered. Tariffs barriers are just but one of the impediments to the trading process. With the flattening of the tariff rates across the globe, experts are now looking at trade facilitation in order to improve trade outcomes.

Studies as to how trade facilitation affects inequality in the Philippines are yet to be done currently. Thus, this paper seeks to provide contribution on the inequality analyses by examining how trade facilitation and consequently increased connectivity of regions through road and maritime networks can be helpful in narrowing the income gaps in the Philippines.

2.5.2. INFRASTRUCTURE DEVELOPMENT IN THE PHILIPPINES

The main marker of connectivity for an archipelagic country would naturally fall on the country's transportation infrastructure. The availability of roads and bridges allows for mobility of goods and people. Since the Philippines is composed of about 7,107 islands, the presence of seaports that accommodates maritime travel is also a vital component that facilitates connectivity among Philippine regions. Moreover, the transportation infrastructure also improves the connectivity of the regions located in the periphery to become more integrated in areas of economic, cultural and political centers (Llanto, Basilio and Basilio 2005).

Infrastructure development in the Philippines, however, was also ruled to be uneven between regions and this is regarded to be one of the main drivers of disparity in economic outcomes across regions (Lamberte, et al. 1999), (Basilio and Gundaya 1997). Manasan and Chatterjee (2003) surveyed the infrastructure development in the country from 1975 to 2000 and concluded that most infrastructure projects, comprising roads, power and energy, irrigation and telecommunications infrastructures, were built in great concentration within the National Capital Region and its surrounding regions. A

growing clamor of the voting public for the government to prioritize infrastructure development in the periphery has led to the shift in policy of deliberately increasing infrastructure projects in regions farther from the capital from 1987 to 2000. However, Manasan and Chatterjee (2003) maintained that this move by the government did not really improve the distribution of infrastructure. Nonetheless, the island of Mindanao, located in the southern Philippines was found to have benefited the most through this policy change when significant increase in infrastructure projects were apportioned in the region.

Apart from the unequal development in infrastructure, the Philippines, is also falling behind its Asian counterparts in terms of over-all infrastructure spending. It was noted that the budget allocation of the country for infrastructure development has been perennially lower than the international standards. Llanto (2011) stressed that the Philippine government's spending on infrastructure has constantly missed the World Bank's recommendation of five per cent of the GDP, which should allow the Philippines to meet its infrastructure needs in the coming decade.

Nonetheless, there are infrastructure projects that have gained considerable focus in terms of distribution and quantity, and this is rural area electrification. Although electrification projects undoubtedly brought improvements on how people lived their lives, especially those who are in the periphery. This does not absolve the modest developments of the Philippines in terms of spatial connectivity of regions through road constructions and improving road quality.

This seemingly inattention to transport infrastructure development in the Philippines is unfortunate since it was noted to open various economic opportunities for many Filipinos. In a study by Ramos et al. (2012), they observed that in the rural Philippines, development of infrastructure system is an important stimulus for the increase in non-farm incomes, albeit, such effect could also fuel the increasing disparity between agricultural and non-agricultural wages, infrastructure development allows for improvements in the income level of those who are in the periphery and may augment the over-all income distribution and levels of the country as well.

As highlighted in Ramos et al. (2012), transport infrastructures enable households or individuals to be relatively closer to economic centers by reducing mobility costs. This then supports the notion that the proximity to urban centers affects the sources of household income, specifically the composition of nonfarm income (Haggblade, Hazell and Dorosh 2007), (Deichmann, Shilpi and Vakis 2008). Moreover, the relative improvement in infrastructure also promotes the participation of household members in nonfarm activities. The distance of the firms and businesses from major cities are also ascertained as significant determinant for industry locations and the composition of

rural nonfarm activity (Sonobe and Otsuka 2006).

As noted in the Section 2.5.1, not many studies were done in the Philippines that looked into a comprehensive impact of trade facilitation on either poverty and income inequality, thus we draw the valuable lessons from earlier researches on the positive influence of infrastructure development in the country and to economic outcomes and welfare. Infrastructure quality in the country being the main driver of better trade facilitation is then examined as to whether it can explain inequality over the years.

3. THEORETICAL FRAMEWORK

3.1. TRADE AND INEQUALITY⁶

3.1.1 TRANSACTION COSTS THEORY

Transaction costs theory connects trade facilitation to income distribution by considering the existence of buyers and sellers of commodity in an economy. To earn a profit, the sellers' price should be higher than the buyers' price and the price differential then compensates for the real resources used up in the trade transaction (the cost of trade facilitation). However, once the seller and buyers are not directly connected, either due to the lack of information or lack of accessibility, the market usually employs "intermediaries" who bridges this gap to realize an exchange.

Meanwhile, another view concerns the transaction costs as part of the traded goods, as if *"only a fraction of the ice exported reaches its destination as un-melted ice."* This 'iceberg model' shows a reduction in transaction costs saves real resources and makes an economy more efficient. (Samuelson 1954)

Following these arguments, the United Nations Social and Economic Council (UNSEC) (2003) noted the following impacts of trade facilitations to prices and to those who are part of the market:

⁶ As described by the United Nations Social and Economic Council (2003) in "Income Distribution Impact of Trade Facilitation in Developing Countries." Background Document for the International Forum on Trade Facilitation.

- 1) *Production efficiency and resource allocations are improved.* In the advent of trade facilitation the degree of competition within domestic producers are enhanced by lowering transactions costs of goods import and export. Although it may lead to short-term unemployment, increased welfare is possible in the long term if efficiency in production follows.
- 2) *Goods available to the public become cheaper.* Better trade facilitation, which reduces inefficiencies and obstacles to trade, can pave way for reduced domestic price of goods. This is realized as cheaper foreign goods becomes available in the domestic market or through cutting rents that may have previously been captured by domestic producers.

Trade facilitation, through lower trade transactions costs can in turn improve the price of imports and import substitutes and reduce the cost of exports and exportable goods. The over-all impact on income however, depends on whether labor is a net consumer or producer of each class of goods and on whether labor is assumed to be mobile within countries.

3.1.2 PRODUCTION EFFECTS OF TRADE FACILITATION: FACTOR MARKETS

The UNSEC (2003) maintained that trade facilitation can affect the production side two-ways. First, a decline in imported inputs price and improvements in export sector by means of a more efficient trading environment can lead to increase in the demand for labour to produce exports. Consequently, if sectors that compete with imports will be exposed to more competition and demand for these goods will decline, concomitantly labour demand for this sector will fall.

Trade facilitation's impact to income distribution depends largely on how changes are transmitted from output prices to wage rates, for example labor and intermediate goods and services. Conditional on the situation at hand, the transmission mechanism can be improved, weakened or distorted by the labor market⁷. Recalling, the Stolper-Samuelson theory, freer trade should help augment incomes in developing countries, as they are expected to utilize their comparative advantage to export labor-intensive goods. Increasing the national income will in turn allow the sub-groups inside the country to

⁷A more thorough discussion on this relationship can be found in the background document prepared by the United Nations Social and Economic Council (2003).

gain opportunities of improved welfare through lower inequality and poverty alleviation. This is on the back of the assumption that wages in these countries are relatively lower than the developed economies.

3.1.3 CONSUMPTION EFFECTS OF TRADE FACILITATION: PRICE TRANSMISSION

Apart from the resulting improvements in the export outcomes, which have been the case for the Philippines after becoming more open to trade (as highlighted in Section 2.5.1), trade facilitation can also benefit the people through lowering of imports prices. This is however dependent on the size of the trade transaction costs saved from the increased efficiency of better trade facilitation. If the transaction costs from trade protected inefficient local production – then trade facilitation can pave way for cheaper imports which in turn could put pressure on local firms in order to improve their efficiency or to their output suitably to lower production costs to keep these firms from shutting down. This, however, can only be true if conditions in the world markets are competitive and product differentiation exists within markets.

Moreover, a more efficient trading environment could lead to availability and disappearance of goods in the market. Further, it was highlighted that the welfare gains associated with the ability to obtain goods that were unobtainable before tend to be much larger than the gains associated with changes in the relative prices of existing goods.

3.2. NEW ECONOMIC GEOGRAPHY AND INSTITUTIONS ON INEQUALITY⁸

The New Economic Geography (NEG) models look into how transport costs, economies of scale, and market size determines agglomeration wherein the crowding of economic activity in a certain area (Krugman, *Geography and Trade* 1991); (Krugman and Elizondo, *Trade Policy and Third World Metropolis* 1996) follows how the aforementioned determinants varies across time and across spatial locations. On the side of the firms, the incentive to agglomerate, most notably preferring larger over smaller cities, increases with access to larger markets—the so-called “home market effect.” If the cost of access to a bigger market were lowered, either from reduction in transport costs or opening up to trade, this would normally provide incentives for firms and producers to agglomerate. Consequently, it creates incentives for workers and other

⁸As described by Farole (2013) *Trade, Locations and Growth* in “The International Geography of Trade, Lagging Regions and Global Markets” The World Bank

firms in the input-output relationships to locate in the same regions where economic activity abounds, resulting to labor migration and capital movements. Farole (2013) noted that this contributes to the emergence of the Marshallian economies—“*thick labor markets, thick supply markets, and knowledge spillovers—which serves as centripetal forces that supports production activities to cluster in core areas*” (Fujita, Krugman and Venables 1999), which in turn contributes to the widening of within-country disparities.

Nonetheless, Farole (2013) also noted that some agents that reverse the above process could also occur. This include higher land rents in urban centers, tight spaces and congestion, and the relative ease of accessibility to natural resources in the periphery along with other immobile factors were regarded as “centrifugal forces” that makes economic activity flow from the urban centers to the periphery (Fujita, Krugman and Venables 1999), (Krugman, Geography and Trade 1991), (Paluzie 2001).

Meanwhile, there is another set of theories that aim to shed light on the core-periphery gap issue, and are referred to as institutional theories. As the name suggests, it highlights the role of “appropriate” institutions towards regional performance, and how it affects the long-run patterns of regional growth and underdevelopment. This group of theories involves a wide array of approaches to identify the link between institutional conditions and the process of agglomeration and growth. Nonetheless, the basic tenets of the model contends that immature institutions which is characterized by weak governance, lack of capacity, and the presence of rent seeking can impede the implementation of economic growth-supporting policies and even if such policies are introduced, they are also unlikely to be sustained (Acemoglu, Modeling Inefficient Institutions 2006), (Acemoglu and Johnson, De Facto Political Power and Institutional Persistence 2006). As the NEG, institutional theories look at institutional quality as determinant of the bias of development outcomes in favor towards agglomeration. This is on the back of the quality of human capital, and the effectiveness of institutions on the aggregate can be strongly affected by its scale and depth.

Condensing the aforementioned theories—agglomeration can in fact result to higher inequality. Agglomeration appropriates most of the gains to the metropolitan cores potentially leaving the regions in the periphery behind. The urban centers are seen to possess the location advantage since it shelter large markets and harbor deep labor pools compared to their rural area counterparts. The urban centers are also more connected to the international markets, and the clusters of diverse suppliers and institutions, which in turn produce strong externalities and promote innovation. These advantages attract investments from abroad. Moreover, it was noted that regions that are relatively near the metropolitan cores have a tendency to gain from the spillovers and congestion-related dispersion. Meanwhile, the regions that are far from the core have fewer opportunities to take advantage of the spillovers and are more likely to be less connected to the regional and international markets. Such phenomenon, expose the periphery from significant drawbacks and impedes their development unto becoming

competitive locations that can accommodate bigger economic activity (T. Farole, Trade, Location and Growth 2013).

4. DATA AND METHODOLOGY

4.1.1 FAMILY INCOME AND EXPENDITURE SURVEY

This paper primarily utilized the data from the Family Income and Expenditure Survey (FIES) to derive the annual inequality measures per region. The FIES data available for the author ranged from years 1985 to 2012. The Philippines' National Statistical Office (NSO) administers the FIES every three years. Thus, the available data points for the paper was 9 years, with the exception of year 2003, which was not available to the author during the course of completing this paper.

The FIES mainly provides relevant information on “household income and expenditure along with the household characteristics that are deemed as important factors that affect the movements of income and expenditure levels in the Philippines”. The FIES is also the main data source for government economist and policy makers in “the estimation of the country’s poverty threshold and incidence” (Ericta and Fabian 2009).

The FIES questionnaire contains household information on “levels of consumption by item of expenditure as well sources of income in cash and in kind. The FIES specifically discusses levels of living and disparities in income and spending patterns of families belonging to different income groups. The survey also includes related information such as the number of family members employed for pay or profit (or as wage, salary, or own-account workers); occupation, age, and educational attainment of household head; and other housing characteristics” (Philippine Statistics Authority 2014)

4.1.2. INFRASTRUCTURE DATA

To account for the Trade Facilitation capacity of the Philippines over the years, the paper looked into the infrastructure development indicators particularly the roads systems and the existing seaports in the country from the year 1985 to 2012. Infrastructure development which are deemed to be public investments by the Philippine government are believed to have affected the trade logistics and trade facilitation capacity of the country and the interconnectedness of economic activities, the mobility of people between region and within regions and hence may have affected

the levels of inequality in the region. This is under the assumption that some regions are more connected to a larger market or may have been more mobile in terms of labor and capital exchange to actually improve their income levels over the years. If this assumption were correct, then it would naturally result to income disparity between regions. Moreover, the differences in income distribution in the urban and rural areas, along with the difference in the characteristics of households inside a region are also factored into the analysis.

4.1.2. A. ROAD LENGTHS AND QUALITY

The infrastructure data are used to account for the quality of trade facilitation. Firstly, the paper utilized the roads length data reported by the Philippines' Department of Public Works and High Ways (DPWH). Publicly available data for the regional disaggregation of road lengths spanned from the early 1980s to 2000. Hence the paper was able to pair the FIES household data with the road lengths data from 1985 to 2000 (Department of Public Works and Highways 2013).

Roads lengths are then disaggregated according to the materials used to build the roads— namely concrete, asphalt, gravel and earth. This paper used two characteristics of the data accessible. First is the road availability, which is measured by the total length of roads per region and the percentage length of the road regardless of construction materials to the total length of roads for the whole country.

Then the paper looks at whether there is difference between the road qualities per region. Concrete and asphalt roads are considered high quality roads and gravel and earthen surface roads are considered as low quality. We use the percentage length of concrete and asphalt road to the regional total and the sum length of concrete and asphalt road as marker for the quality of roads per region.

4.1.2. B. SEAPORT UTILIZATION, QUALITY AND CAPACITY

The presence of seaports has been vital for the trading process in an archipelagic nation like the Philippines. Most notably the internal movements of goods rely heavily on the seaports that connect the country's numerous islands. Regional products are shipped to the urban centers for domestic distribution or shipped directly to foreign lands as part of the country's exports. Notwithstanding, seaports are also important infrastructures that facilitate movement of people within the country considering its comparably lower costs vis-à-vis air travel. (Philippine Ports Authority 2015)

The paper utilizes the annual reports of the Philippine Ports Authority containing the various performance indicators of the public seaports in the country. The data from the PPA website spans from mid-1990s to 2014. Hence, in the analysis made in the paper, seaports indicators were paired with the FIES household survey data from 1997 to 2012. The seaports indicators are then aggregated by region in the interest of estimating possible association of regional port performance with regional inequality.

The first indicator employed in the regression analyses is the annual total tonnage recorded in a port. The ratio of the regional aggregate tonnage to the total tonnage recorded for the year is used as an indicator for Seaport Capacity.

Then we look into the annual passenger traffic data tallied per ports. The total ratio of passengers per region to the total passenger traffic recorded for all ports both for embarkation and disembarkation are used in this paper as an indicator for the passenger seaport utilization.

Lastly, to look at the relative efficiency of the seaport per region, the data on cargo throughput is used. Cargo throughput is deemed as the most basic production index for measuring the port development, as it tallies the transactions and processes undertaken by the port at a given time, in this case, annual cargo throughput are used. The cargo throughput provides reference for ports to organize its production, make its development plans and construction. Moreover, this indicator can reflect the economic situation and the development level of the area where the port is located (Zhang, et al. 2003).

Regional cargo throughput ratio to the total cargo throughput is utilized as an indicator for the relative efficiency of one region over the other, in terms of maritime transport quality. The cargo throughput is further divided into foreign and domestic shipments (both inward and outward shipments). The analysis is then expanded on whether there is a significant difference in its association to regional inequality when the ports operating in that corresponding region are used mainly for domestic goods exchange or if that port is utilized mainly as a hub for exports and imports.

4.2. DATA TRANSFORMATIONS

We present the transformation conducted on the data, particularly the income and expenditure data of the FIES prior to computing for the regional inequality measures. In this section we describe how adult equivalence and real values of income and expenditure were obtained.

4.2.1. ADULT EQUIVALENCE

The consumption and expenditure data for each household are transformed to their adult equivalent values. This method is usually employed in poverty studies so as to account for the varying needs among household members considering the difference in expenditure pattern and the value of these expenditures per household member. Moreover, doing this takes into account the economies of scale in consumption (Haughton and Khandker 2009).

Two approaches are explored in arriving at the adult equivalence values. The first one is based from the OECD scale referred to as the "OECD expenditure" also known as the expenditure per adult equivalent. The OECD adult equivalents is given by:

$$\text{Adult Equivalence} = 1 + 0.7(N_a - 1) + 0.5N_c \quad (1)$$

Where N_a is the number of adults and N_c the number of children in the household.

Another cruder method investigated in the process of writing this paper is to assign adult consumption and expenditure with the value of $\theta=1$ and choosing a $\theta<1$ to represent the adult equivalence value of consumption and expenditure of the other age groups that comprises a certain household. This is then multiplied to the number of household members under that age bracket.

Table 1 Adult Equivalence Computation

(N_i = No. of Individuals per age group)	Adult Equivalents (θ_i)
Less than 1	0.25
Less than 7	0.25
Less than 15	0.55
Less than 25	0.75
Adult(25-59)	1.0
Over 60	0.75

$$\text{Adult Equivalent} = \sum N_i \theta_i \quad (2)$$

Nonetheless, we report the results from the OECD Adult equivalence data transformation as it is deemed more official. The adult equivalence transformation is used in lieu of the usual per capita transformation done in other studies involving the analysis of inequality values.

4.2.2. CONSUMER PRICE INDEX DEFLATOR

Moreover, the reported values in the FIES are deemed to be in nominal terms. In the interest of correcting inflationary effects to both income and expenditure over the years, the Consumer Price Index (CPI), which is referred to as a measure for the price level in the economy or simply the weighted average of the prices of goods and services that households purchase was used to derive the real values for expenditure and income. In this paper we used the year 2000 as the base year. The Philippines' NSO publishes the CPI data on a monthly basis.

4.3. MEASURING INEQUALITY⁹

4.3.1. GINI COEFFICIENTS OF INEQUALITY

The Gini coefficient¹⁰ is regarded as one of the most widely used measures of inequality. The formula for the Gini coefficient is given as:

$$\text{Gini} = 1 - \sum_{i=1}^N (x_i - x_{i-1}) (y_i + y_{i-1}) \quad (3)$$

Where x_i is a point on the x-axis, and y_i a point on the y-axis. When there are N equal intervals on the x-axis, Equation (3) can be simplified to:

⁹World Bank Handbook of Poverty and Inequality, accessed <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,contentMDK:22405907~pagePK:148956~piPK:216618~theSitePK:430367,00.html>, 10 February 2015

¹⁰The Gini is derived from the Lorenz curve, a cumulative frequency curve that compares the distribution of a specific variable (usually income or expenditure) with the uniform distribution that represents equality.

$$\text{Gini} = 1 - \frac{1}{N} \sum_{i=1}^N (y_i + y_{i-1}) \quad (4)$$

As described by (Haughton and Khandker 2009), the Gini coefficient is not entirely a satisfactory measure of inequality. Recalling the six criteria for inequality measurements of (Bourguignon 1979), namely:

- i. Mean independence. If all incomes were doubled, the measure would not change.
- ii. Population size independence. If the population were to change, the measure of inequality should not change, all else equal.
- iii. Symmetry. If any two people swap incomes, there should be no change in the measure of inequality.
- iv. Pigou-Dalton Transfer sensitivity. Under this criterion, the transfer of income from rich to poor reduces measured inequality.
- v. Decomposability. Inequality may be broken down by population groups or income sources or in other dimensions.
- vi. Statistical testability. One should be able to test for the significance of changes in the index over time. This is less of a problem than it used to be because confidence intervals can typically be generated using bootstrap techniques.

The Gini satisfies only the first four. While this is true, other inequality measures explored in the next section are known to fully satisfy the presented criteria.

4.3.2. GENERALIZED ENTROPY MEASURES

The commonly used measures of inequality that satisfies all the criteria presented above are the Theil indices and the mean log deviation. Both belong to the family of generalized entropy (GE) inequality measures. The general formula as described in Anand (1983) and as presented in the World Bank's Handbook of Poverty and Inequality (2009) is given by:

$$\text{GE}(\alpha) = \frac{1}{\alpha(\alpha-1)} \left[\frac{1}{N} \sum_{i=1}^N \left(\frac{y_i}{\bar{y}} \right)^\alpha - 1 \right] \quad (5)$$

Following equation (5), we note that y represents the mean income per person (or expenditure per capita). The resulting value of the GE measures can take the value between zero and infinity. Zero represents an equal distribution and higher values of GE

indicate higher levels of inequality. The parameter α in the GE class represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value. When α takes lower values, the GE is deemed to be more sensitive to changes in the lower tail of the distribution. Meanwhile, for higher values of α , the GE becomes more responsive to variations in the upper tail of the distribution. Most common values of α employed by researchers are 0, 1, and 2.

GE (1) is also known as the Theil's T index where it can be represented as:

$$GE(1) = \frac{1}{N} \sum_{i=1}^N \frac{y_i}{\bar{y}} \ln \left(\frac{y_i}{\bar{y}} \right) (6)$$

Meanwhile, GE (0) is referred as the Theil's L and is sometimes called the mean log deviation measure, is given by:

$$L = \frac{1}{N} \sum_{i=1}^N \ln \left(\frac{\bar{y}}{y_i} \right) (7)$$

$$L = \sum_j \left(\frac{N_j}{N} \right) L_j + \sum_j \left(\frac{N_j}{N} \right) \ln \left(\frac{\bar{y}}{\bar{y}_j} \right) (8)$$

4.3.3. DECOMPOSING THE GINI COEFFICIENT BY INCOME SOURCE

Gini Coefficient as a measure of inequality cannot be written as a separable measure for within-groups and between-group inequality however it can be decomposed by income source. As highlighted by Lerman and Yitzhaki (1985), the Gini can be obtained from different sources of income.

$$G = \sum_{k=1}^k S_k G_k R_k (9)$$

From equation (9), S_k is the share of income source k in the total income, G_k signifies the source of Gini related to the distribution of income from source k , and R_k stands for the correlation of income from the source k with the distributional income.

Moreover, from the study by Stark, Taylor and Yitzhaki (1986), they highlighted that the influence of any income component upon total income inequality depends on three things:“(a) How important the income source is with respect to total income (S_k);(b) How equally or unequally distributed the income sources (G_k); and(c) How the income source and the distribution of total income are correlated (R_k).”

Lopez-Feldman (2006) noted that a source of income could potentially have bigger impact on inequality if it comprises a large portion of the total income. Nonetheless, if the sources of income tend to have almost identical shares to the total income i.e., ($G_k = 0$), then its impact on inequality is predicted to be small even if the value of income from that source is high. Meanwhile, if the value of income from an income source is great and there exist a disparity in terms on the distribution of shares among income sources (S_k and G_k are large), then a change in the value of one of the income sources can potentially widen or narrow the income gap. The impact is dependent on who draws their income from this income source—the wealthy or poor households.

If the richer segment of the population (those who occupies the higher portion of the income distribution) earns the income from this specific source, and the income stemming from this source is unequally distributed (R_k is positive and large), then it can increase inequality. Nonetheless, if an income from a specific income source disproportionately flows to those who are at the bottom of the income distribution (poorer households), increasing the income levels of this income source can then reduce inequality, leading to a possible equalizing effect on the income distribution.

Following the discussion of Gini decomposition above, Lerman and Yitzhaki (1985) demonstrated how to estimate the effect of small changes in a specific income source on inequality while holding income levels from all other sources constant. That is a small change in income from a specific source k can be represented by ey_k , where e is close to 1 and y_k represents income from source k . Thus taking the partial derivative of the Gini coefficient with respect to a percent change e in source k is equal to(see Stark, Taylor, and Yitzhaki [1986]):

$$\frac{\partial G}{\partial e} = S_k(G_k R_k - G) \quad (10)$$

G represents the Gini coefficient of total income inequality prior to the income change. The percent change in inequality coming from the small percent change in income from source k is equal to the original contribution of source k to income inequality minus source k 's share of total income:

$$\frac{\partial G}{\partial e}/G = \frac{S_k G_k R_k}{G} - S_k \quad (11)$$

In STATA, this procedure can be estimated following Lopez-Feldman (2006), and allows the calculation of the impact that a marginal change in a particular income source will have on inequality. Moreover, bootstraps can be employed to obtain standard errors and confidence intervals. However, the presented results in the Results Section will consist of the standard estimation without bootstrapping.

4.3.4. CHANGE IN INEQUALITY OVER TIME

Following the decomposition of the entropy measures for inequality wherein one can ascertain the within-group and between-group inequality, provided that there are numerous time periods in question, the analyses can be extended further. As described in the World Bank Hand Book of Inequality, the change in the Theil index can be further decomposed to provide useful information on how inequality by groups changed over time.

When information on a welfare measure is available for two time points, the author can then identify the components of the change in inequality. As described in (Haughton and Khandker 2009), “ $n_j = N_j/N$ becomes the proportion of those in the sample who are in the j^{th} subgroup, and adding the time subscripts 1 (for initial period) and 2 (for the second period), where appropriate, the Theil L is then further decomposed through temporal changes”:

$$\Delta L \approx \sum_j n_j \left[\ln \left(\frac{\bar{y}_{j,1}}{\bar{y}_{j,2}} \right) - \ln \left(\frac{\bar{y}_{j,1}}{\bar{y}_{j,2}} \right) \right] + \sum_j \left[L_j + \ln \left(\frac{\bar{y}}{\bar{y}_j} \right) \right] \Delta n_j + \sum_j n_j \Delta L_j \quad (12)$$

4.4. REGRESSION ANALYSES FOR INEQUALITY

In analyzing inequality determinants we follow Equation (13) as the general model for inequality. Wherein $Ineq_{it}^*$ representing inequality for entity i at time period t is said to be explained by the various explanatory variables, in this case the vector x_{it} .

$$Ineq_{it}^* = \alpha + \sum \beta x_{it} + \varepsilon_{it} \quad (13)$$

However, if we are interested on how differences in the levels of inequality over time affects future inequality outcomes, we can utilize Brown's (1952) Classical habit persistence model, wherein we transform equation (13) to equation (14) by taking the difference of inequality between time t and $t-1$.

$$Ineq_{it} - Ineq_{i,t-1} = \lambda (Ineq_{it}^* - Ineq_{i,t-1}), 0 < \lambda < 1 \quad (14)$$

Equation (14) is then transformed to (15) to obtain a dynamic panel equation as in Rodriguez-Pose (2013).

$$Ineq_{it} = \lambda \left(\alpha + \sum \beta x_{it} + \varepsilon_{it} \right) + (1 - \lambda) Ineq_{i,t-1}, 0 < \lambda < 1 \quad (15)$$

Nonetheless, given the data constraints and in search for a possible Dynamic Panel Data (DPD) model that can be used to analyze how past values of inequality affects the presents, this paper still borrows a similar logic from equation (13) to (15) but adopt the version of Kurita and Kurosaki (2011), when they compared growth, inequality and poverty dynamics for Thailand and the Philippines.

Due to the restrictive number of survey data available in the conduct of this study the author cannot employ the first-difference GMM methods as described by Bond et al (2001). This paper, however, followed Kurita and Kurosaki (2011) who noted how Blundell and Bond (1998) proposed an alternative method for small sample estimations. In contrast to Kurita and Kurosaki's (2011) paper, the focus of this research is only on inequality and the three-equation system GMM they used was reduced to a two system GMM. That is the system GMM is done only for inequality measured by the Gini Coefficient and consumption measured by Adult equivalent expenditure.

In specifying the model, the functions are estimated with parameters in which the current period distribution of the independent variable can describe the future distributions. In the estimation of a Dynamic Panel Model, with the presence of the lagged dependent variable as an explanatory variable, the need to correct for the possible arising DPD bias must be considered thoroughly. The method proposed by Blundell and Bond (1998) was used in running the dynamic panel analyses following Roodman (2011), in the implementation of system GMM in the STATA. The Dynamic Panel Model then is specified as follows:

$$Ineq_{it} = \beta_{11}y_{i,t-1} + \beta_{12}Ineq_{i,t-1} + X_{i,t-1}\theta_1 + \alpha_{1i} + \eta_{1t} + \epsilon_{1it} \quad (16)$$

$$y_{it} = \beta_{21}y_{i,t-1} + \beta_{22}Ineq_{i,t-1} + X_{i,t-1}\theta_2 + \alpha_{2i} + \eta_{2t} + \epsilon_{2it} \quad (17)$$

4.4.1 DEPENDENT VARIABLES

The dependent variables are represented by the $Ineq_{it}$ in equation (16) which is regional inequality as measured by the Gini Coefficient, specifically, the Gini coefficient for region i at a given year t in log form. Meanwhile in equation (17), y_{it} represents the average consumption of a region at a given year. Consumption in this case is measured by the adult equivalence expenditure per region, converted to their log form.

4.4.1. INDEPENDENT VARIABLES

The independent variables for this analysis are basically the lag values of inequality and consumption, represented by $Ineq_{i,t-1}$ and $y_{i,t-1}$, also derived from the FIES household survey and is measured from Gini Coefficients and Adult Equivalence Expenditures, respectively (all in log values).

4.4.3. CONTROL VARIABLES

The control variables used in the DPD, which is represented by the $X_{i,t-1}$ are the following:

- a) Urbanity (Location of the Household) – That is the ratio of households located in urban areas per region;
- b) Educational Attainment of Household Head – The ratio of households with household heads with a college degree or higher as the highest level of educational attainment;
- c) Proportion of aged household members – The ratio of households with household heads that are 65 years old or higher;
- d) Agricultural Households- The ratio of households that derive their income or a portion of their income from agricultural activities; and
- e) Gender of the Household Head – The ratio of household heads that are female.

Meanwhile, α_{1i} , in the system of equation represents the varying factors across regions but are time invariants, hence the fixed effects. Meanwhile, η_{1t} represents

for the national level shocks that happened within the time series, for example, in time t . This time events are expected to have affected the regions similarly but possibly at varying magnitudes. For example the financial crisis in 1997 and the El Nino phenomenon of the same year that brought massive crop failures and agricultural losses in the country owing to long standing droughts in that year. Finally, the unaccounted variances in the system of equation are represented by the error term, ϵ_{1it} .

4.5. INEQUALITY AND TRADE LOGISTICS

Moving back to one of this paper's main objective, first we consider a simple regression model:

$$Ineq_{it} = \beta X_{it} + \delta Trade_{it} + \alpha_i + \epsilon_{it}, t = 1 \dots T, i = 1, \dots, N \quad (18)$$

This is to ascertain the connection between the regional inequality and the quality of trade facilitation through infrastructure development.

Following the representations made in the section of the inequality dynamics analysis, we represent the left hand side of the Equation (18) as $Ineq_{it}$, which is the regional inequality level for region i , at a given year t . In this case we utilized the Gini Coefficients, Theil L and Theil T indices as measures of regional inequality in the interest of comparing the results. Going forward, it is expected that regardless of the inequality measure used in the regression, the results would still be the same.

Moreover, we represent the control variables similar to the ones used in the DPD as X_{it} . They are again: Urbanity, Ratio of Households with head that at least finished college, ratio of households with head that is aged 65 or above, ratio of households that is headed by a female, and ratio of households that obtain income source fully or in part from the agricultural activities. Meanwhile, infrastructure indicators are used to represent the $Trade_{it}$, the trade variables. As discussed in the data section these includes road length, road quality, seaports capacity, seaports passenger utilization and seaports relative efficiency. The fixed effects are also represented in the model as α_i , along with the idiosyncratic error that represents the variations unexplained by the model. Thus the fixed effect model is specified as:

$$Ineq_{it} - \overline{Ineq}_i = \beta(X_{it} - \bar{X}_i) + \delta(Trade_{it} - \overline{Trade}_i) + (\alpha_i - \alpha_i) + (\epsilon_{it} - \bar{\epsilon}_i) \quad (19)$$

In the tradition of transforming the basic regression model with fixed effects we follow the assumption that α_i is correlated with the X_{it} , hence correcting for this to avoid the possible omitted variable bias is conducted by differencing the average of each variable to net out the time invariant α_i in the analysis.

In the estimation procedure for various fixed effect model, it is worth noting that the robust standard errors were considered.

The infrastructure variables can be noted to measure two different components. Due to the archipelagic topography of the Philippines it can be noted that the road networks indicators namely road length and road quality captures mostly the within region connectivity. That is, road networks tend to be more representative of areas of production, usually rural, and its accessibility to markets, more specifically for land masses that are directly connected to the urban centers or other regions, case in point are the regions located in the biggest island of the Philippines—Luzon. This is also where the capital, Manila is situated.

Nonetheless, given the earlier discussion, we cannot discount the importance of seaport networks in the region-to-region exchanges as it also plays a significant role in connecting producers from other islands, for example, agricultural products from the island of Mindanao in Southern Philippines, to bigger markets as well, either from the center of trade in Central Philippines, the island of Cebu or to the National Capital Region. Majority of goods exchange within the country although employs road networks also use the maritime transport system.

In this study, however, we consider seaports as gateways to international trade as most foreign shipments arrive in the country through the seaports. This is in line with the consideration of ports as important factors of goods and people movement within the country. Consequently, these foreign shipments and products also traverse the maritime transport system in the process of distributing the imported goods to other parts of the country.

5. RESULTS AND DISCUSSIONS

5.1. INEQUALITY IN THE PHILIPPINES, 1994-2012

In this section the results of the decomposition analyses is presented. Following the methods of Estudillo (1997) decomposition analysis of inequality by population grouping were done. Further, the method of Lopez-Feldman (2006) was used to examine how various income sources affects inequality outcomes through decomposition of Gini coefficients. We also briefly examined the difference between market inequality and net inequality (Ostry, Berg and Tsangarides 2014) in the Philippines, by comparing inequality outcomes from income before and after taxes.

5.1.1. POPULATION SHARE AND INCOME GAP

The share of urban population showed a slight decline from 1994 to 1997 from 50 percent to 48 percent. Whilst, the urban ratio was observed to have increased after 1997 until 2009, suggesting that after the crisis, there is a trend where rural households made their way to settle in urban areas. Nonetheless, this trend was observed to have reversed in 2012. The most recent FIES data showed that the percentage of urban households relative to their rural counterparts fell.

In terms of relative income share of urban households to rural households, there is a considerable downward pattern from 1997 to 2012. The urban household used to enjoy on average a relative income of more than twice that of the rural households. However, this was slowly eroded over time, suggesting a slight narrowing in the rural and urban household income disparity. Most notably, there is a sudden decline in the urban household share in 2012. This could suggest that, most recently, opportunities for household in the urban areas are now starting to become available also for the rural families. This effect may also be due to income transfers from the core (urban areas) to the periphery (rural areas), as some household in the rural areas may have family members sending remittances from the urban centers thus lowering the gap between the urban-rural incomes.

Table 2: Population Share of Households, Philippines (1994-2012)

Household Group	<i>Population Share of Households, Philippines (1994-2012)</i>					
	1994	1997	2000	2006	2009	2012
Sector:						
Urban	0.498	0.475	0.491	0.496	0.498	0.449
Rural	0.502	0.525	0.509	0.504	0.502	0.551
Age:						
Less 25	0.013	0.020	0.012	0.015	0.013	0.015
25-34	0.168	0.189	0.140	0.154	0.118	0.112
35-44	0.279	0.275	0.274	0.266	0.250	0.229
45-54	0.231	0.221	0.252	0.249	0.261	0.265
55-64	0.171	0.162	0.170	0.170	0.193	0.207
Above 65	0.138	0.133	0.151	0.146	0.165	0.172
Education:						
No Education	0.052	0.044	0.041	0.027	0.026	0.023
Primary Educ Undergrad	0.249	0.232	0.219	0.220	0.208	0.197
Prim. Educ Grad	0.247	0.235	0.204	0.189	0.188	0.187
High School Undergrad	0.107	0.110	0.109	0.124	0.118	0.116
High School Grad	0.175	0.185	0.203	0.218	0.227	0.236
College UnderGrad	0.090	0.106	0.106	0.118	0.119	0.150
At least College Grad	0.080	0.089	0.117	0.105	0.113	0.091

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

Table 3: Relative Income of Household Groups, Philippines (1994-2006)

Household Group	<i>Relative Income of Household Groups</i>					
	1994	1997	2000	2006	2009	2012
Sector:						
						Rural=100
Urban	2.127	2.444	2.386	2.181	2.030	1.777
Rural	1.000	1.000	1.000	1.000	1.000	1.000
Age:						
						All=100
25-34	0.900	0.871	0.869	0.920	0.912	0.919
35-44	0.964	0.924	0.935	0.905	0.898	0.883
45-54	1.011	1.047	1.064	1.029	0.975	1.021
55-64	1.085	1.105	1.051	1.107	1.104	1.108
Above 65	1.068	1.140	1.064	1.069	1.124	1.045
All	1.000	1.000	1.000	1.000	1.000	1.000
Education:						
						All=100
No Education	0.551	0.485	0.445	0.430	0.403	0.407
Primary Educ Undergrad	0.593	0.532	0.521	0.532	0.529	0.520
Prim. Educ Grad	0.737	0.654	0.647	0.643	0.662	0.651
High School Undergrad	0.835	0.756	0.706	0.756	0.705	0.709
High School Grad	1.117	1.040	0.973	0.995	0.957	0.961
College UnderGrad	1.561	1.528	1.461	1.401	1.345	1.484
At least College Grad	2.699	2.986	2.613	2.619	2.602	2.148
All	1.000	1.000	1.000	1.000	1.000	1.000

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

^{a/}Relative income less than one means income of the group falls below the mean income of all households

Examining the variation in terms of age groups, there is a notable increase in the share of households with heads aged 45 and above from 1994. Along with the corresponding decline in the share of households with heads aged 25 to 34. This suggests that over the years, household heads may have been non-changing with the increase in the age of

household heads is captured by the shift in the growing share of household with older heads and consequently lowering shares of households with younger heads.

It is also worth noting that the same observation made by Estudillo (1997) for the 1961-1991 remains true for the 1994-2012 data. Specifically, income pattern follows an inverted-U shape. For the Philippines, the relative income of households increases with age and then peaks at the 55-65 bracket. After graduating from below 65 year-old brackets, on average the household income gradually falls suggesting the end of the productive phase of the household head's life as he or she retires from work. This follows the productive cycle of an individual wherein; income increases as they move to the corporate or bureaucratic ladder together along with the experience gained and age. Nonetheless, in the time of retirement they will then cease to receive the same level of income that they previously enjoyed and may turn to savings depletion or through pension benefits for support. In the case of the Philippines, pension payments are comparatively lower than the income received during productive years.

Table 4: Income Share per Household Groups, Philippines (1994-2012)

Household Group	<i>Income Share per Household Groups</i>					
	1994	1997	2000	2006	2009	2012
Sector:						
Urban	0.673	0.674	0.683	0.675	0.665	0.595
Rural	0.327	0.326	0.317	0.325	0.335	0.405
Age:						
Less 25	0.014	0.020	0.015	0.018	0.016	0.016
25-34	0.156	0.173	0.127	0.146	0.114	0.109
35-44	0.275	0.262	0.264	0.248	0.232	0.211
45-54	0.231	0.231	0.263	0.253	0.255	0.267
55-64	0.179	0.172	0.170	0.181	0.207	0.219
Above 65	0.146	0.143	0.160	0.154	0.177	0.178
Education						
No Education	0.030	0.023	0.020	0.013	0.012	0.010
Primary Educ Undergrad	0.153	0.132	0.122	0.123	0.117	0.107
Prim. Educ Grad	0.186	0.161	0.139	0.126	0.130	0.127
High School Undergrad	0.092	0.086	0.081	0.097	0.088	0.086
High School Grad	0.197	0.195	0.200	0.223	0.224	0.232
College UnderGrad	0.138	0.155	0.150	0.165	0.162	0.132
At least College Grad	0.205	0.247	0.287	0.253	0.268	0.307

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

In terms of education groupings, there is a steady upward trend of household heads gaining more education in the country. This is evident with the increasing proportions of households with heads that obtained at least High School diploma and those who started attending college but did not graduate (college undergraduates). Both group saw an increase from 17.5 percent in 1994 to 24 percent in 2012, and 9 percent in 1994 to 15 percent in 2012, respectively. Moreover, household heads with no education

declined steadily in the course of two decades as they tallied at 5 percent in 1994 dropping to almost 2 percent in 2012. This is also true for the ratio of household heads with only elementary education or elementary diploma holders, both with shares falling from 25 percent to 20 percent in a span of 18 years.

Relative income of those who finished at least a college degree has consistently been more than two-folds of the average population's income. Income share of those who finished college has increased from 20 percent in 1994 to 30 percent in 2012. Meanwhile for those who have no education, the income share has continuously contracted from 3 percent in 1994 to a measly 1 percent in 2012. Suggesting that higher educational attainment in the Philippines on average allows for a family to have higher income levels. Nonetheless, it is worth stating that there should be higher incentives to finish a college degree, as the income share of those who dropped out in college is not significantly higher than those who graduated in high school, but the income share of those who are college undergraduate are significantly lower than those who finished college.

5.1.2. WITHIN-GROUPS AND BETWEEN GROUPS INEQUALITY

Examining the general entropy measures of inequality and the Gini coefficients from years 1997 to 2012, the measure of over-all inequality has been declining, albeit, marginally. This is after a marked increased in inequality from 1994 to 1997. The spike in inequality in 1997 can be traced from the Asian financial crisis, which took a toll on the Asian economies during the period in question, which includes the Philippines (Alburo 1999). Nonetheless, what may have actually affected the Philippine households more during that year is the El Nino phenomenon which cause massive crop failures brought by extended drought in many parts of the archipelago (Datt and Hoogeveen 2003).

Table 5: Theil L= G (0), Philippines (1994-2012)

Household Group	Theil L = G(0)					
	1994	1997	2000	2006	2009	2012
Sector:						
Urban	0.294	0.331	0.318	0.279	0.272	0.270
Rural	0.184	0.201	0.211	0.221	0.212	0.245
All	0.304	0.347	0.343	0.318	0.301	0.300
<i>Within-group inequality</i>	0.239	0.263	0.264	0.250	0.242	0.256
<i>Within-group inequality (%)</i>	78.5	75.8	76.9	78.6	80.4	85.4
<i>Between-group inequality</i>	0.065	0.084	0.079	0.068	0.059	0.044
<i>Between-group inequality (%)</i>	21.5	24.2	23.1	21.4	19.6	14.6
Age:						
Less 25	0.337	0.324	0.334	0.303	0.283	0.265
25-34	0.283	0.309	0.316	0.302	0.295	0.293
35-44	0.305	0.321	0.326	0.304	0.286	0.285
45-54	0.284	0.350	0.345	0.312	0.286	0.298
55-64	0.306	0.365	0.326	0.335	0.306	0.302
Above 65	0.346	0.414	0.404	0.340	0.334	0.318
All	0.304	0.347	0.343	0.318	0.301	0.300
<i>Within-group inequality</i>	0.303	0.345	0.341	0.316	0.299	0.298
<i>Within-group inequality (%)</i>	99.7	99.4	99.5	99.4	99.3	99.6
<i>Between-group inequality</i>	0.001	0.002	0.002	0.002	0.002	0.001
<i>Between-group inequality (%)</i>	0.3	0.6	0.5	0.6	0.7	0.4
Education						
No Education	0.214	0.188	0.204	0.190	0.155	0.177
Primary Educ Undergrad	0.176	0.191	0.185	0.186	0.169	0.166
Prim. Educ Grad	0.196	0.189	0.189	0.183	0.176	0.168
High School Undergrad	0.186	0.198	0.186	0.207	0.173	0.173
High School Grad	0.196	0.209	0.205	0.203	0.179	0.179
College UnderGrad	0.230	0.241	0.243	0.213	0.205	0.255
At least College Grad	0.282	0.354	0.325	0.242	0.241	0.224
All	0.304	0.347	0.343	0.318	0.301	0.300
<i>Within-group inequality</i>	0.201	0.214	0.213	0.201	0.185	0.189
<i>Within-group inequality (%)</i>	66.1	61.8	62.2	63.1	61.5	63.2
<i>Between-group inequality</i>	0.103	0.132	0.130	0.117	0.116	0.110
<i>Between-group inequality (%)</i>	33.9	38.2	37.8	36.9	38.5	36.8
All	0.304	0.347	0.343	0.318	0.301	0.300

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

Examining the urban rural-divide, there has been an opposing trend in the inequality measures for the urban and rural areas. It can be highlighted that inequality in urban areas remained higher compared to that of the rural areas in the span of 18 years. From Estudillo's (1997) analysis she noted that urban inequality was elevated compared to the rural inequality due to the employment structure in the urban areas where industries that pays highest (finance, insurance, real-estate and professional services) co-exist with industries that pays very little (retail trade and personal services) as oppose to the more uniform employment structure in the rural areas wherein most families derive their income from agriculture. Moreover, there is significant number of unemployed household heads in the urban areas compared to the rural areas.

Table 6: Theil T=G (1), Philippines (1994-2012)

Household Group	Theil T = G(1)					
	1994	1997	2000	2006	2009	2012
Sector:						
Urban	0.344	0.417	0.380	0.307	0.303	0.295
Rural	0.206	0.229	0.244	0.257	0.248	0.285
All	0.361	0.436	0.412	0.356	0.341	0.334
<i>Within-group inequality</i>	0.299	0.356	0.337	0.291	0.285	0.291
<i>Within-group inequality (%)</i>	82.7	81.5	81.7	81.7	83.4	87.1
<i>Between-group inequality</i>	0.063	0.081	0.076	0.065	0.057	0.043
<i>Between-group inequality (%)</i>	17.3	18.5	18.3	18.3	16.6	12.9
Age:						
Less 25	0.373	0.354	0.359	0.303	0.288	0.270
25-34	0.318	0.377	0.368	0.332	0.328	0.319
35-44	0.358	0.364	0.373	0.344	0.319	0.318
45-54	0.331	0.421	0.398	0.339	0.322	0.335
55-64	0.367	0.481	0.392	0.373	0.345	0.338
Above 65	0.445	0.608	0.552	0.399	0.396	0.356
All	0.361	0.436	0.412	0.356	0.341	0.334
<i>Within-group inequality</i>	0.360	0.434	0.411	0.354	0.339	0.333
<i>Within-group inequality (%)</i>	99.7	99.6	99.6	99.5	99.4	99.6
<i>Between-group inequality</i>	0.001	0.002	0.002	0.002	0.002	0.001
<i>Between-group inequality (%)</i>	0.3	0.4	0.4	0.5	0.6	0.4
Education						
No Education	0.336	0.228	0.313	0.232	0.182	0.231
Primary Educ Undergrad	0.202	0.215	0.202	0.212	0.193	0.191
Prim. Educ Grad	0.216	0.211	0.208	0.200	0.202	0.186
High School Undergrad	0.194	0.223	0.197	0.236	0.190	0.193
High School Grad	0.213	0.222	0.214	0.221	0.189	0.186
College UnderGrad	0.250	0.291	0.268	0.216	0.215	0.268
At least College Grad	0.337	0.440	0.382	0.258	0.259	0.230
All	0.361	0.436	0.412	0.356	0.341	0.334
<i>Within-group inequality</i>	0.244	0.284	0.268	0.228	0.214	0.218
<i>Within-group inequality (%)</i>	67.6	65.1	65.1	63.9	62.7	65.4
<i>Between-group inequality</i>	0.117	0.152	0.144	0.128	0.127	0.116
<i>Between-group inequality (%)</i>	32.4	34.9	34.9	36.1	37.3	34.6
All	0.361	0.436	0.412	0.356	0.341	0.334

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

Urban inequality in terms of Gini coefficients inched lower, as it trends persistently at 40 percent areas from 2006 to 2012. Nonetheless, rural inequality has consistently been gaining over the years—from 33.6 percent in 1994 to an almost 40 percent in 2012. This suggests that the seemingly persistent over-all inequality in the country is fuelled by the increase in rural inequality. The rising inequality in the rural areas follows the observation made by Estudillo, Quisumbing and Otsuka (2001), wherein the growing difference in non-agricultural wages and agricultural wages in the rural areas bouys up inequality.

There is also a sudden shift in the employment of household heads in the rural areas. Employment in non-agricultural activities increased to 31.8 percent in 2012 from 27.14 percent in 2009, while families who engaged in agriculture such as livestock and poultry raising, crop farming and gardening, fishing and forestry in the rural areas fell considerably from 27 percent in 2009 to less than 20 percent in 2012. This suggests that more families in the rural areas are finding jobs outside of agriculture.

Table 7: Gini Coefficients, Philippines (1994-2012)

Household Group	Gini					
	1994	1997	2000	2006	2009	2012
Sector:						
Urban	0.417	0.441	0.434	0.408	0.405	0.403
Rural	0.336	0.351	0.361	0.370	0.362	0.389
All	0.428	0.455	0.453	0.438	0.428	0.426
Age:						
Less 25	0.450	0.443	0.444	0.422	0.412	0.399
25-34	0.415	0.432	0.437	0.428	0.423	0.423
35-44	0.429	0.440	0.443	0.429	0.418	0.417
45-54	0.415	0.458	0.454	0.434	0.418	0.425
55-64	0.430	0.465	0.443	0.449	0.431	0.427
Above 65	0.453	0.493	0.487	0.451	0.449	0.438
All	0.428	0.455	0.453	0.438	0.428	0.426
Education						
No Education	0.349	0.337	0.344	0.340	0.304	0.324
Primary Educ Undergrad	0.329	0.343	0.338	0.339	0.324	0.320
Prim. Educ Grad	0.347	0.341	0.342	0.337	0.329	0.323
High School Undergrad	0.338	0.349	0.339	0.356	0.327	0.326
High School Grad	0.343	0.354	0.352	0.349	0.331	0.330
College UnderGrad	0.368	0.375	0.379	0.356	0.351	0.390
At least College Grad	0.407	0.456	0.434	0.378	0.378	0.365
All	0.428	0.455	0.453	0.438	0.428	0.426
All	0.428	0.455	0.453	0.438	0.428	0.426

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

Examining between groups inequality, it paints a picture of a converging urban-rural gap as the urban-rural inequality has been declining over the years. From the review period, between groups inequality started with a high of 24 percent in 1997 but gradually declined to less than 20s level, and settled to only 14.6 percent in 2012. This suggests that despite the popular notion that the urban areas get a hefty amount of the income share due to concentration of economic activities in the urban places, total inequality in the country is only explained by less than 20 percent of the urban-rural gap. This concurs with the conclusion made by previous researches (Estudillo 1997),

(Balisacan 2003). Illustratively, in 2012, if the discrepancy emanating from the income difference between the rural and urban families were removed, the over-all national inequality would only be reduced by 14.6 percent. This however, remains a significant number, but what explain the differences in inequality outcomes between families are factors other than their level of urbanity.

Looking at the age disaggregation results, inequality level for all age group has declined in a span of almost two decades. Highest inequality can be observed in households with heads above 65, followed by families with head who are aged between 45-64 years. While lowest inequality by age group is observed amongst the younger age groupings. Nevertheless, the differences in income between groups over the span of 18 years explains very little of the over-all inequality. Between-group inequalities only ranged from a high of 0.7 percent in 2009 to a low of 0.3 percent in 1994.

In terms of highest education attained by the households, inequality level has also declined, particularly for those families with head who have attained at least college level. Nonetheless, highest inequality is also observed amongst families with a household head that possess at least a college diploma over the review period. This is quite intuitive wherein the variation in the income levels for college graduates is high since the average income across sectors that employ college graduates are also quite dispersed. Meanwhile, families who tally lowest inequality level are those with household heads who did not attend school or have very little years of schooling. This also follows the notion that unskilled wages do not vary greatly— hence inequality is not very high in these groups.

Further taking into account the differences in educational attainment of households, it would paint a totally different picture from what has been observed from between age group inequality. Based on the Theil L index decompositions, differences in educational attainment amongst households can actually explain on average 37 percent of the total inequality from 1994 to 2012. This implies that almost half of the over-all inequality in the country can be explained by the variation in educational attainment. The difference in skill level then explains most of the disparity in opportunities available for people in the Philippines.

5.1.3. AFTER TAX AND BEFORE TAX INEQUALITY

In this paper, the effect of the taxation in the Philippines was briefly examined by comparing inequality values derived from income values before tax and inequality values derived from income after tax. This follows how the recent study of the IMF(Ostry, Berg and Tsangarides 2014) where they differentiated market inequality

(before tax) and net inequality (after tax), albeit, the goal of this computation is not similar to the IMF Discussion Paper. This information is important in the sense that Filipino families based their consumption on the disposable incomes they receive and this has implications on whether the tax system of the country widens the income disparity or closes the income gap. Based from the comparison made in Figure 1, the Gini coefficients after tax were lower on average by 1 percent from the period of 1994 to 2012 relative to the Gin before tax. This suggests that the income tax system in the Philippines may have an inequality correcting (inequality lowering) characteristics, although such decline in the Gini coefficient may not be too substantial. Hence, further analysis on this matter is recommended using more appropriate techniques to determine if the difference inequality outcomes generated from the two series are indeed statistically and practically significant.



Figure 1: Gini Coefficients, Before and After Tax Comparisons in the Philippines, 1994-2012

5.1. 4. CHANGE IN INEQUALITY OVER TIME

Following the discussions in section 4.3.3, wherein the Theil L index was decomposed by between-inequality group and within-inequality group measures for inequality. Since we are examining inequality values from 1994 to 2012, we can then further decompose inequality by groups as it moves across time. In this case, we only examine how inequality has change from the changing interaction of populations between the urban

and rural areas and how income disparity emanating from differences in urbanity has evolved through time.

Recalling the Equation (12):

$$\Delta L \approx \sum_j n_j \left[\ln \left(\frac{\bar{y}_{j,1}}{\bar{y}_{j,2}} \right) - \ln \left(\frac{\bar{y}_{j,1}}{\bar{y}_{j,2}} \right) \right] + \sum_j \left[L_j + \ln \left(\frac{\bar{y}}{\bar{y}_j} \right) \right] \Delta n_j + \sum_j n_j \Delta L_j$$

We denote the first term as the change in inequality owing to the changes in population, which accounts for the rural to urban shifts; the second term denotes the changes in inequality stemming from the differences between urban and rural incomes. Lastly, the third term represents the within group differences that contributed to the changes in the over-all inequality.

Based from Table 8, we can note that most of the changes in inequality from 1994 to 1997 can be attributed to changes in within group inequality. This is a natural result following the calculations presented in the previous section on how within-group inequality explains more than 80 percent of over-all inequality in the urban and rural areas. Nonetheless, inequality between urban and rural areas can be traced mostly from the shift in the population composition, notably the rural to urban migration. From 1994-1997 the difference in the income between the urban and rural household weighed down the over-all increase in inequality and thus in part countered the population shift effect and the within-group change that supported the increase in inequality outcome for the country in the said time period.

Table 8: Theil L Temporal Changes (1994-2012)

Year	Theil L (yt) percent (*100)	yt-yt-1	Change in Inequality (*100)	Population shift effect (*100)	Effect of change in incomes (*100)	Change in within-group inequality (*100)
1994	30.377					
1997	34.683	1997-1994	4.306	2.085	-0.204	2.425
2000	34.291	2000-1997	-0.392	-2.354	1.871	0.091
2006	31.785	2006-2000	-2.506	-4.91	3.796	-1.392
2009	30.088	2006-2009	-1.697	0.151	-1.062	-0.786
2012	29.96	2012-2009	-0.128	-3.428	1.896	1.404

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

In general, the over-all trend of inequality from 1997 to 2012 follows a downward trend. It is worth noting that from 1997-2000 and 2000-2006, the income differences between the urban and rural areas buoyed up the inequality, which suppresses the downward pull of the rural to urban population shift effect that caused the inequality between the two years to fall only mildly. Meanwhile from 2006-2009, this trend reversed when the population effect offsets the downward influences of income differences from 2006-2009 to inequality. Inequality however, fell from 2006 to 2009 as the within group inequality also declined during that period.

Finally from 2009-2012, inequality difference was lowest since 1997, where in disparity in income between urban and rural household increased markedly along with within-group changes in inequality. Both effects countered the larger negative pull of the population shift effect during the period.

5.1. 5. GINI COEFFICIENT DECOMPOSITION BY SOURCE

Table 9: GINI (Income Inequality by Income Source, Philippines (1994-2012))

	Δ Inequality/1% Δ in Income source					
<i>Source</i>	<i>1994</i>	<i>1997</i>	<i>2000</i>	<i>2006</i>	<i>2009</i>	<i>2012</i>
TOTAL						
Agricultural Income	-0.14	-0.14	-0.12	-0.15	-0.14	-0.14
Non Agri Income Source	0.14	0.11	0.12	0.15	0.14	0.14
Salary Wages	0.03	0.05	0.05	0.04	0.03	0.04
Entrepreneurial Income	-0.08	-0.05	-0.09	-0.10	-0.08	-0.06
Other Source	0.05		0.04	0.05	0.05	0.03
URBAN						
Agricultural Income	-0.07	-0.06	-0.05	-0.05	-0.04	-0.05
Non Agri Income Source	0.07	0.05	0.05	0.05	0.04	0.05
Salary Wages	-0.02	0.00	0.00	-0.03	-0.03	-0.02
Entrepreneurial Income	-0.03	0.00	-0.04	-0.02	-0.02	-0.02
Other Source	0.05		0.04	0.05	0.05	0.04
RURAL						
Agricultural Income	-0.18	-0.22	-0.20	-0.21	-0.18	-0.17
Non Agri Income Source	0.18	0.17	0.20	0.21	0.18	0.17
Salary Wages	0.11	0.06	0.13	0.07	0.04	0.05
Entrepreneurial Income	-0.14	-0.06	-0.15	-0.13	-0.09	-0.08
Other Source	0.02		0.03	0.06	0.05	0.03

Note: Based from the calculations of the author from the Family Income and Expenditure Survey (1994-2012)

As discussed in Section 4.3.3, we cannot decompose the Gini coefficient through its between-group and within-group components. Nonetheless, following the transformation done in Lerman and Yitzhaki (1985) and Stark, Taylor and Yitzhaki

(1986) and employing the techniques described by (Lopez-Feldman 2006) in STATA, we are able to compute for the relative effects of income source to inequality with the basic analyses of how inequality changes after a 1 percent increase of income from a specific source. This follows equation (11).

In this section we analyze two separate income groups. First we separate income between Agricultural income and Non-Agricultural income, and then we separate income source through Major Sources of Income as described in the FIES, namely Salary Wages, Entrepreneurial Income and Other Income Sources. Moreover, we look at how income source elasticity differs between urban and rural areas.

The summarized results of the Gini decomposition is presented in Table 9, while complete annual Gini decomposition can be found in the Appendix Section, from Tables 12-17. In general, we can observe that an increase in agricultural income may alleviate income inequality. This is because most of those who earn income from the agricultural sources are the poor families. As shown in Tables 12-17, agricultural income is not disproportionately distributed among those who earn it, but its correlation to Gini coefficient is not high suggesting that agricultural income flows mostly to the lower portion of the income distribution. This is in contrast to non-agricultural income wherein a one percent increase in non-agricultural income keeping agricultural income constant may lead to higher inequality. Results suggest that non-agricultural income is also unequally distributed (high G_k). However, it favors the richer segments of the population. Thus increasing non-agricultural income may benefit only those who are at the top of the income distribution and in turn widens the income disparity between the rich and the poor. This is observable from years 1994-2012.

Moreover, it can be noted that when income source is disaggregated by major income source, the inequality improving (lowers inequality) income source is the entrepreneurial income, while, salary income, if increased may lead to higher inequality.

Disaggregating the areas by urbanity, it can be noted that for urban areas, agricultural income can be inequality improving, while non-agricultural income augmentation may lead to higher level of inequality. This is also true in the rural areas. Nonetheless, the difference arises when the major sources of income between urban and rural area are compared. For the urban area, both salary wages and entrepreneurial income may lower inequality. While for rural areas, only the entrepreneurial income is seen to have the potential to improve inequality. This result follows how the salary wages is derived from various industries in the urban areas. The variance of salary income in the urban areas tend to be higher as urban areas harbors different industries with very different levels of income payments and hires either both skilled and unskilled workers, which also have uneven income levels. Thus, the inequality lowering effect of improving salary

wages in the urban areas most likely captured the income difference between sectors and between types of workers. Moreover, when this gap is narrowed, inequality inside the urban locations would tend to fall as well.

The results of this analysis capture the variability of employment structure per income source either in rural and the urban areas. This is in addition to whether income growth per source benefits a huge portion of the population. That is, if an income source is improved but it only benefits a few portion of the population (particularly, the rich segment) then inequality could rise. Nonetheless, if it benefits flows disproportionately to the poor then it will lower inequality. In rural areas, increasing salary income affects only a few and thus contributes to higher inequality. This is not the case for salary income in the urban areas, as most workers in urban areas rely on salary incomes. Thus improving salary income in the urban area would reduce inequality, as more individuals are able to benefit from this development.

In the case of entrepreneurial salaries, it may not only involve owners of businesses. The entrepreneurial activities in the data may have captured the Small and Medium Enterprises wherein, improvements in the income is distributed to the owner of business and also to the employed labor of the enterprises, thus the inequality reducing effect.

5.2. INEQUALITY DYNAMICS IN THE PHILIPPINES, 1985-2012

In this section, we examine the results of the System GMM estimation using the Blundell and Bond (1998) method and implemented in STATA following Roodman (2011). The output of this analysis is reported in Table 10 and Table 11.

Table 10: Dynamic Panel Data System GMM Results: Equation I

System GMM Results				
Dependent Variable= Inequality				
(With year effects)	Coefficient	Std.Err.	t-stat	P>t
Consumption (t-1)	-0.0570	0.0148	-3.8600	0.0010
Inequality (t-1)	0.5598	0.1647	3.4000	0.0030
Intercept	0.3951	0.2700	1.4600	0.1620
Wald chi-square test	chi2(15) = 52.35 Prob > chi2 = 0.000			
Hansen J test	chi2(15) = 12.61 Prob > chi2 = 0.632			
AR(1)	Pr > z	=	0.0150	
AR(2)	Pr > z	=	0.4510	
With controls	Coefficient	Std.Err.	t-stat	P>t
Consumption (t-1)	-0.0783	0.0224	-3.5000	0.0030
Inequality (t-1)	0.6708	0.1885	3.5600	0.0020
Education (t-1)	0.0006	0.0050	0.1100	0.9130
Urban (t-1)	0.0000	0.0008	0.0500	0.9620
Age (t-1)	0.0027	0.0042	0.6500	0.5270
Income Source(t-1)	-0.0180	0.0375	-0.4800	0.6370
Gender(t-1)	-0.0006	0.0036	-0.1800	0.8630
Intercept	0.0044	0.1479	0.0300	0.9770
Wald chi-square test	chi2(14) = 54.41 Prob > chi2 = 0.000			
Hansen J test	chi2(14) = 10.48 Prob > chi2 = 0.726			
AR(1)	z = -2.26	Pr > z =	0.024	
AR(2)	z = -0.91	Pr > z =	0.360	

Table 11: Dynamic Panel Data System GMM Results: Equation II

System GMM Results				
Dependent Variable=Consumption				
(With year effects)	Coefficient	Std.Err.	t-stat	P>t
Consumption (t-1)	0.7716	0.1265	6.1000	0.0000
Inequality (t-1)	-1.2299	0.3781	-3.2500	0.0050
Intercept	0.2396	0.2121	1.1300	0.2740
Wald chi-square test	chi2(15) = 27.54 Prob > chi2 = 0.025			
Hansen J test	chi2(15) = 6.94 Prob > chi2 = 0.959			
AR(1)	z = -1.31	Pr > z =	0.190	
AR(2)	z = -1.12	Pr > z =	0.261	
With controls	Coefficient	Std.Err.	t-stat	P>t
Consumption (t-1)	0.5097	0.0868	5.8700	0.0000
Inequality (t-1)	-1.4989	0.5486	-2.7300	0.0080
Education (t-1)	0.0131	0.0071	1.8400	0.0700
Urban (t-1)	0.0010	0.0014	0.6800	0.4980
Age (t-1)	0.0081	0.0071	1.1400	0.2570
Income Source(t-1)	-0.0818	0.2028	-0.4000	0.6870
Gender(t-1)	-0.0033	0.0079	-0.4100	0.6800
Intercept	1.2463	1.0290	1.2100	0.2420
Wald chi-square test	chi2(15) = 30.39 Prob > chi2 = 0.011			
Hansen J test	chi2(15) = 9.28 Prob > chi2 = 0.862			
AR(1)	z = -1.07	Pr > z =	0.285	
AR(2)	z = -1.16	Pr > z =	0.246	

Table 10 shows that the System GMM was estimated with two different specifications: first, is a regression for inequality and consumption with only year-effects and next is regression for both dependent variables but includes the control variables discussed in Section 4.4. It is worth noting that for the estimation done under the System GMM, results were able to satisfy the Hansen J Test for overriding restrictions wherein the null hypothesis that over-identifying restrictions are valid is not rejected.

Moreover, the Arellano-Bond Test for zero autocorrelation of the second order, i.e., AR (2) on the first differences also yields acceptable results, as the null hypothesis of no auto-correlation was not rejected.

Looking at the coefficients reported in Table 10, the lagged values of inequality are found to be significant explanatory variable for the present period inequality and present period consumption. Specifically, when past inequality is regressed with the present inequality, the system GMM yields a positive coefficient for past values of inequality. The coefficients are tested to be significantly different from zero and one implying that the level of inequality in the past can affect present inequality outcomes. In standard regression analysis, this could suggest that higher inequality in past could predict that inequality in the present would remain at elevated levels. In the case of the Dynamic Panel Models however, where the coefficient lies between 0 and 1— that is for year-only effects estimation the coefficient is equal to 0.55 and for with controlled variables estimation, the coefficient is equal to 0.67. This implies that inequality in regions that are previously higher have a tendency to decline in the next period. This is line with the findings of Kurita and Kurosaki (2011).

Moving on to examining the coefficient that denotes the effect of previous inequality outcomes on the present consumption in the regions, this is reported in Table 11. It can be noted that the system GMM tallied coefficients that are negative. From the year-effects only results, the coefficient is equal to -1.2. Meanwhile, from the model with many controls, it tallied past inequality coefficient to be equals -1.5. This implies that higher inequality in the past may result to lower level of consumption in the future period for regions in the Philippines.

Table 12: Fixed Effect Regressions on Inequality and Consumption with Lagged Values

Fixed Effects								
(With year effects)	Dependent Var= Inequality				Dependent Var=Consumption			
	Coefficient	Std.Err.	t-stat	P>t	Coefficient	Std.Err.	t-stat	P>t
Consumption (t-1)	-0.0419	0.0404	-1.0400	0.3030	0.2187	0.1112	1.9700	0.0550
Inequality (t-1)	0.1708	0.0883	1.9300	0.0570	-0.2906	0.2898	-1.0000	0.3210
Intercept	-1.9086	0.5373	-3.5500	0.0010	10.3243	1.3503	7.6500	0.0000
With controls	Coefficient	Std.Err.	t-stat	P>t	Coefficient	Std.Err.	t-stat	P>t
Consumption (t-1)	-0.0690	0.0234	-2.9400	0.0040	0.8846	0.1604	5.5100	0.0000
Inequality (t-1)	0.2135	0.0951	2.2500	0.0280	-0.8122	0.4284	-1.9000	0.0640
Education (t-1)	-0.0072	0.0272	-0.2600	0.7930	-0.0375	0.0284	-1.3200	0.1940
Urban (t-1)	0.0163	0.0558	0.2900	0.7700	-0.0092	0.0055	-1.6800	0.1000
Age (t-1)	0.0316	0.0442	0.7200	0.4760	0.0152	0.0250	0.6100	0.5450
Income Source(t-1)	-0.0066	0.0449	-0.1500	0.8830	0.9713	0.3924	2.4800	0.0170
Intercept	0.0831	0.1937	0.4300	0.6690	-0.8556	0.7638	-1.1200	0.2690

The System GMM results are then compared to the fixed effects regressions. Based on the results presented in Table 12, the level of significance for the coefficients of interests remain valid while the signs did not change, suggesting robustness in the estimate of the system GMM. Albeit, the results in the fixed effect regressions are deemed smaller in value vis-à-vis the System GMM estimation.

5.3. TRADE FACILITATION AND INEQUALITY

In this section we look at the association of trade facilitation indicators, wherein we used road networks and seaports indicators as markers for trade facilitation. To do this, fixed effect regression was conducted to estimate the potential relationship of road networks and seaports characteristics in the region with the prevailing inequality outcomes. The estimation also employed the control variables discussed in Section 4.5. Meanwhile, two type of inequality will be reported namely, Gini Coefficients and Theil Index. This is done to verify that the results of the estimation remain the same even if different measures of inequality are employed in the analyses.

Moreover, we specify a similar regression described above without the National Capital Region. This is reported in Table 21 in the Appendix. This is to correct for the effect of Manila being the center of economic activity in the country, which is also the region with the best road system in terms of surface quality. Moreover, In terms of seaports indicators, the NCR also outperform all other regions in every seaports indicator.

Further, we also specified a regression equation with the squared of income adult equivalence as an explanatory variable to account for possible quadratic relationship of income and inequality as proposed by Kuznets (1955), which is reported in Table 22.

5.3.1. ROAD LENGTHS AND ROAD QUALITY AND INEQUALITY

Tables 19 to 22, found in the Appendix, summarize the association of inequality to both road lengths and road quality in the Philippine regions. Table 19 shows the model with inequality measured by the Gini Coefficients, Table 20 to 22 utilizes the Theil index.

Based on Tables 19 to Tables 20, the association between longer road lengths and inequality is negative and significant at 5 percent level. Meanwhile, higher share of road lengths in the regions compared to the national total is also negatively associated with inequality. The same observation can be noted when road quality indicators are paired with inequality outcomes, regardless of whether the Gini or the Theil Index are used to measure inequality. Particularly, the fixed effect regression shows that regions with higher quality of roads tend to have lower level of inequality.

Testing for the robustness of the model, we run the same regression without the NCR, which is Metro Manila, also a regression controlling for the squared of income. From the abovementioned tables, it can be noted that signs of the coefficient was unchanged along with the corresponding statistical significance.

5.3.2. SEAPORTS INDICATORS AND INEQUALITY

The results of the fixed effects regression for Seaports indicators are reported in Tables 19-22. Recalling the discussions in Section 4.5, inequality measures were paired with seaports indicators namely, seaports capacity measured by ratio of regional gross tonnage to the national total, passenger utilization which is measured by the ratio of the total passengers who used the ports in a specific region over the tallied annual total passengers who used the Philippine seaports both for embarkation and disembarkation, and lastly we look at the seaport quality measured by the Ratio of the Cargo throughput in the region to the national total.

Moreover, the difference in destinations and the origins of the shipments were examined. This is done by examining ratio of the domestic cargo throughputs and the ratio of foreign cargo throughputs to the total value of cargo throughputs per region.

Hence, seaports in the regions can be categorized as mostly serving domestic shipments or foreign shipments.

Different to the roads quality and road length ratio, the seaport indicators have positive coefficients in the estimations, except for the domestic throughputs indicators. The seaports indicators were significant at least at 10 percent level when regressed with inequality measures. This is also true for both Gini and Theil indices and the coefficients become larger when the quadratic relation of income and inequality is factored in.

However, it is worth noting, that if the National Capital Region is netted out from the analysis, the significance for Seaport capacity and Seaport utilization is eroded to a point that the coefficients becomes statistically close to zero. Nonetheless, even without NCR, the Seaport quality as an explanatory variable for inequality remains significant at 10 percent level.

Meanwhile, examining the difference between foreign and domestic cargo throughput, the relationship of the two indicators with inequality outcomes are both significant still but with signs pointing towards opposite directions. Ratio of domestic shipments throughput have negative coefficients in relation to inequality. However, foreign shipment throughput ratio like other seaports indicator yielded a positive coefficient. This is somewhat analogous to the results in 5.3.1, wherein, road networks connectivity captures domestic linkages and it shows a negative association with inequality. In the case of seaports that serve mostly domestic markets, it tends to have negative association to inequality.

6. CONCLUSION AND RECOMMENDATIONS

6.1. CONCLUSION

This paper reviewed how inequality in the Philippines has evolved in the past two decades. Moreover, it also provides evidence on why persistent inequality needs to be addressed. With the perceived impact of present period inequality on future outcomes for inequality and income levels, the effectiveness of interventions installed by authorities in the present can very well dictate how people will live their lives in the future. Hence, it is important to determine which policy interventions should the government must employ to address the problem of inequality. In this paper, we found out that the difference in connectivity of regions to one another, which also determines

their relative connectivity to domestic and foreign markets have implications on the inequality outcomes per region. This confirms the potential of improved spatial connectivity of regions through infrastructure development as a public policy tool to address inequality in the Philippines.

Inequality in the Philippines exhibited a downward trend from 1994 to 2012. Inequality only increased in 1997 due to the Asian Financial Crisis and the severe droughts affecting the country brought by the El Nino Phenomenon. The observed fall in inequality during the review period, however, was quite slow. This result, in part, diverges from the previous studies' assertion that inequality in the country was stable, and never falling from its elevated levels. The divergence can be traced from the difference in time periods and the data transformation employed in this paper. Nonetheless, the easing inequality at the national level is mirrored by the downward trend in inequality across population groups (urbanity, age and educational attainment).

The urban-rural divide remained a viable source of income disparity for the Philippines. However, its contribution to over-all inequality has grown weaker in significance across the years. The difference in the ability among household members, either to secure jobs or their affinity to become entrepreneurs is noted to explain most of the inequality. This is represented by the level of educational attainment of household members, which corresponds to their relative chances of attaining higher income potentials.

The difference in the income levels across income sources, the inherent variability of the skills set needed in each sector to gain employment in that particular sector, and the disproportionate distribution of income from each income sources towards population groups are also noted to have contributed to the evolution of inequality in the Philippines for almost two decades.

In line with the above, it is worth noting that the poor are mostly employed in agricultural activities regardless of urbanity. If agricultural incomes are improved while keeping non-agricultural incomes constant, there is an equalizing effect, which reduces the income gap of between the agricultural sector and the non-agricultural sector. Similar observation is also noted for entrepreneurial activities. Wherein, those who own small businesses are usually at the lower end of the income distribution and if their incomes are increased, then the disparity in income between those who are at the higher income group with those who are in the lower income groups is reduced.

Inequality as a social issue will most likely persist in the long-term, both in the Philippines and with the rest of the world. This is because elevated income disparity often results to less social cohesion and distrust of the citizens towards the government,

which could also be detrimental to economic development. More importantly, as shown in the Dynamic Panel Estimations, inequality outcomes of the present have structural relationship to future inequality outcomes. Thus, the income distribution realized in the present can dictate income distributions among segments of the population in the future. Moreover, it was noted that higher inequality from the past tends to weigh down the income levels and consumption in the future. This supports the idea of lagging regions that are trapped in their present conditions when no substantial policy interventions are put in place.

On the back of the notion that improving income distribution is beneficial for the country, the paper maintained on examining trade facilitation's effect on inequality as a non-tariff barrier to trade. Nonetheless, the analyses limit its focus of trade facilitation to infrastructure quality. This is grounded on the assumption that the trading process in an archipelagic country like the Philippines relies heavily on the efficiency of the road networks and maritime transport to move around goods and people from the periphery to core regions, and vice versa. Meanwhile, better seaports indicators allow for improved mobility of products from international markets to domestic markets. That is, the impact of more efficient transportation reduces the cost of trade.

This paper noted that road networks and seaports is associated with inequality differently. This observation can be traced from the inherent difference of both modes of transportation— either on their cost effectiveness, locations and the main function that they serve. Road networks is believe to capture mostly the accessibility to domestic markets and the improved connectivity of people across regions, of producers and buyers to one another thereby narrowing the relative distance between regions and markets. This in turn contributes to the closing of the gap in income disparity between the regions or the urban and periphery divide. Hence, improved road networks and road quality is associated with lower inequality.

Meanwhile, there is a positive association between seaport quality and capacity with inequality. From here it is worth noting that the most important seaports in the country are located in the biggest cities of the Philippines, for example, Manila in the National Capital Region and Davao City, the economic center of the Southern Philippines. The results of the fixed effect regressions may have captured the nonlinearity of transport cost on the core-periphery divide wherein improved trade process can be bias to areas that are most conducive to businesses and investments. This is on account of international trade being more vibrant in the urban areas that houses larger economic activities. The agglomeration effects (as discussed by the NEG and institutional models) could facilitate the flow of investments and development towards the urban centers. However, this purportedly leaves out regions in the periphery from obtaining further improvements, resulting to increased inequality.

6.2. POLICY RECOMMENDATIONS

Last January 2014, the Philippines faced a dilemma when the port of Manila was heavily reduced in capacity owing to a city ordinance that limits cargo trucks operations when Local officials passed an ordinance to improve the traffic conditions in the Philippine capital. The said ruling, however, resulted to massive port congestion and inefficiencies that greatly affected the movements of goods shipments and the connectivity of domestic-to-domestic markets and domestic-to-foreign markets (Patalinghug, et al. 2015). This local law was repealed after nine months of deliberation (Office of the President 2015), notwithstanding it still left the Philippine economy with humungous losses despite being a short-lived policy (Patalinghug, et al. 2015).

The results obtained from this paper could be instructive for both local and national governments to be more cognizant of the importance of trade facilitation. That is, trade facilitation affects not only businesses that are directly involved in the trading process. Impaired trade facilitation can also affect income distribution and consequently, inequality outcomes. Moving forward, armed with the knowledge, future policies that are restrictive to trade, or regulations that impedes market connectivity, can be avoided.

As highlighted in Section 2.5.2, there remains an ample room for the Philippines to allocate more of its national budget to infrastructure development. Moreover, the need to boost infrastructure quality has yet to fully materialize in the country.

Nonetheless, this study was not able to factor in individual characteristics of each region. Analogous to the heterogeneity of countries, wherein no single policy can cure the economic maladies each country is facing. The policy makers should also be aware on the possible differences of regions in the Philippines. That is, even across regions that are lagging behind they may have differences in terms of potentials in harboring agglomeration effects—are they conducive in housing industrial sectors. Moreover, these regions may have differences in the affinity to sustain connectivity with the international markets or even the bigger domestic markets.

The Philippines, as of current has yet to attain a level of development where it is able to provide services enjoyed by citizens of high-income countries. Following this reasoning, the country may not be able to afford to allocate funds uniformly across regions in terms of infrastructure development. Given that infrastructure development and the increase of connectivity amongst region is ruled to improve regional income distribution, further studies, possibly regional case studies, would help policy makers to determine which among these regions would yield positive returns to the most needed but somewhat limited public investments.

Meanwhile, recalling the results on how the ability of household members explains inequality more than their location differences. We can also argue that better road networks and seaports allows not only the producers to access better and bigger markets but also connects the people residing in the peripheries, possibly low-income households, to be better integrated with high quality education and health-care that usually clusters in the urban centers. Better infrastructures, through improved availability of good roads and less costly transportation supports the development of human capital in the periphery by connecting those who live far from the economic core to the social services that can hone their skills or improved their well-being. This in turn allows them to become more productive members of the society, consequently, improving their chances to have better economic outcomes in the future.

These connections are nonetheless inferred from the decomposition and the regression analyses, direct associations can be explored in future researches as more data on infrastructure and social services becomes available. Future research could also look into how thoroughly the infrastructure development improves access to social services in the country and how this improved access contributes to the changing income distribution across regions and provinces in the Philippines.

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