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The Impact of Globalization on Disaster Risk Trends : A Macro- and Urban-Scale Analysis

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1 .Introduction

In the 1970s, advances in telecommunication technologies and transportation systems, along with the deregulation of markets produced a high intensity of capital mobility and facilitated the formation of a "global" and "informational" (Castells 1996) economy, leading to social and spatial changes in cities and regions throughout the world.

This paper argues that the socio-economic and spatial changes due to the new global economy[2] changed disaster risk patterns by: a) increasing *poverty* and *inequality* and consequently vulnerability[3] from natural disasters[4], both within urban areas and between regions and nations; b) increasing wealth, assets, concentration of population, and thus the exposure[5] in certain cities and regions across the world; and c) changing disaster patterns and disaster risk management opportunities.

This introductory section explains research design and methodology. In section 2, the paper examines several impacts of the new global economy (commonly referred as globalization)[6] and their relation to vulnerability, exposure, and risk from natural disasters in the macro-scale. The focus will be on: 1) increasing vulnerability due to polarization and inequality between world regions, rising poverty and retreat of state; and 2) rising exposure, changing risk trends, and advances in risk management. Section 3 examines globalization and disaster risk trends in the urban scale. Examinations will focus on: 1) increasing urban vulnerability due to changes in the urban form and increasing intra-urban inequalities; and 2) increasing exposure due to increase in the concentration of population, and rising

[2] The global economy is defined as, "[a]n economy with the capacity to work as a unit in real time on a planetary scale" (Castells 1996, 92).

[3] The term *vulnerability* is used in this paper adapting the terminology of the UNISDR, as the potential for loss (human, physical, economic, natural, or social) due to a hazardous event. It is the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard" (UNISDR 2009, 30).

[4] In this paper, the term *natural* is used to represent the type of hazard that inflicts a disaster; it does not imply that disasters occur naturally.

[5] Exposure is defined as "[p]eople, property, systems, or other elements present in hazard zones that are thereby subject to potential losses" (UNISDR 2009, 15).

[6] This paper will use the terms "global economy" and "globalization" interchangeably.

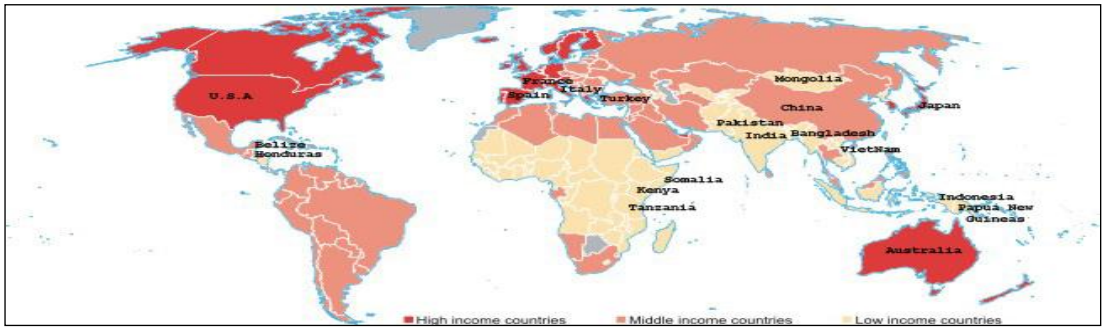
vulnerability due to substandard conditions of living and lack of good governance practices. Both section 2 and section 3 have a theoretical overview as well as a quantitative or empirical one. The paper concludes by assessing the results of this study and discussing what they suggest to the relationship between globalization and disaster risks.

1.1 Research Design and Methodology

Each section (section 2 and section 3) starts with a theoretical overview of the relationship between globalization and disaster risks. Each correlation will be discussed further in the quantitative section, which will bring in results from empirical and/or quantitative studies as well as case studies.

Here, the paper brings in results from the author's dissertation research (Gencer 2007), which examined the parallels between the socio-economic development of countries and the way they are affected by disasters. This is a descriptive statistical analysis executed using frequency distribution and observation of means. In this study, development indicators were correlated with disaster vulnerability of 20 countries in terms of human loss, scope of affected population, and monetary damage for over a 45 year period (1960[7]-2004) for observed year. [8]

In this paper, the collected data set was then used to make other analysis, which measure whether selected development indicators change due to globalization for the same selected countries[9] during the time period from 1960-1980 to 1981-2001. The year 1980 was used subjectively to symbolize the initiation of the new global economy. Development data used in both studies was collected from *World Development Indicators* (WDI Online), *A New Dataset Measuring Income Inequality* (Deininger and Squire 1997), *Global Report on Human Settlements* (UN-HABITAT 2005), and using the *PovcalNet* computational tool of the World Bank. Disaster data for selected countries was collected from *EM-DAT*, *the OFDA/CRED International Disaster Database.* This data includes number of disasters, human loss, and total number of affected and economic loss due to disasters. The following map highlights selected countries in study and their income groups.



[8] Please see Appendix A for the methodology in the selection of countries and indicators used in this research.

[9] With the exception Fig.21 and Fig.2.2 which made a global analysis.

Fig. 1.1 Countries in study and their income groups. (Adapted from *Country Classification by Income Aggregates Reference Map,* http://www.unisdr.org, Accessed in 2005)

Limitations of the Study

There are many socio-economic and political factors, such as political upheavals or pre-existing financial turmoil that can influence the way countries are affected by disasters. Additionally, location of a disaster, size of affected area, and size and location of affected country (such as a small island state) are among several factors that can alter the results of this research. Additionally, some indicators, such as one dollar per day poverty line, do not provide adequate results for cross-country comparison; others such as GDP (Gross Domestic Product) cannot be adequately calculated in a nation with a large informal economy. These factors were limitations of this study, but can be further developed for future analyses. This study aims to provide a basis for an empirical analysis of the relationships between disaster vulnerability and development. Therefore, statistical methods were used for examination of associations, not for experiment purposes, and the results are not conclusive.

Another limitation of the study is the availability of data for comparison for all indicators, and for all years for selected countries. With respect to available data, it should be noted that there could be some discrepancies, especially with data assessing disaster related losses and monetary damage. This research made use of the most noted databases in the fields of hazards and development. However, an upgrade of these databases is essential for future research and for more informed decision-making.

2. Globalization and Disaster Risks in the Macro-scale

As the new global economy facilitated the dominance of certain regions, cities, and groups in the world economy, it also fostered the marginalization of others. As vulnerability "encompasses the conditions determined by physical, social, economic, and environmental factors or processes" (UNISDR 2009, 30), the *poverty* and *inequality* created by this polarized new world order and economy is expected to have changed or increased vulnerability from natural disasters. At the same time, dominance and increase of wealth in certain regions and cities are expected to have increased hazard exposure. The following sub-sections examine direct or indirect effects of globalization: polarization between world regions, retreat of state, rising poverty, inequality, wealth, and assets, technological advances and their relation on vulnerability, exposure, and risk from natural disasters in the macro-scale.

2.1. Polarization between World Regions, Retreat of State, Rising Poverty and Inequality

As new types of production and services of the new global economy, such as telecommunications and technologies, finance, insurance, and real estate (Sassen 1994), spatially tended towards a "simultaneous dispersion and concentration" (Castells 1996, 379), certain regions and cities gained economic dominance, while others marginalized. As the global economy diversified into three major regions (North America, the European Union, and the Asian Pacific region), other areas lacking the dynamics of competition suffered from poverty. A background report, prepared for the *2009 Global Assessment Report (GAR) on Disaster Risk Reduction,* asserts that, "development-related processes in which all countries participate occur in the context of globalization,…, due to intense interaction and the ever increasing importance of large-scale economic, technological, socio-cultural and environmental phenomena involved,...giving explicit consideration to the most relevant development-related processes involved, in explaining sustainable development achievements" (Corrales and Miquilena 2008, 4). Accordingly, a World Bank report summarized the state of the world economy in the 1990s, and explained that even though "growth picked up at the global level, many countries have been left behind, disproportionately the ones that started poor," indicating *the rising polarity* between the world regions that gained from the wealth of globalization and the others that could not join the new economy (Wolfensohn and Bourguignon 2004, 16).

With this new economic system, the mobility of capital required deregulation of markets and new forms of state intervention, and privatization programs started taking place in the mid-1980s. A UN-Habitat (2003, 43) report stated that "the main single cause of increases in poverty and inequality in the 1980s and the 1990s" was "*the retreat of state*." As states' welfare provision declined, "the ability of working class forces . . . to resist the negative impacts of globalization on working conditions and employment, is severely diminished" (Marcuse and Van Kempen 2000, 262). Additionally, it has been argued that "deregulation and reduction of the influence of national government policies, in conjunction with the increasing influence of large private corporations and international public disciplines" in the past twenty years "may increase risk, or impair the effect of risk management policies through a reduction of power and quality of institutions" (Corrales and Miquilena 2008, 17).

Indeed, within the past years, a number of studies demonstrated a link between institutional effectiveness and disaster mortality. A study by David Stomberg (2007) showed that "mortality is lower in countries with greater government effectiveness," and Monica Escaleras (2007) and her colleagues found that "the death toll from earthquakes is higher in countries with greater public sector corruption where earthquake-safe building codes tend not be forced" (Williams 2011, 12). Finally, results of

background reports for the *Natural Hazards, UnNatural Disasters* indicated that "countries with well performing institutions are better able to prevent disasters" (WB and the UN 2010, 8, 115).

In *At Risk*, Ben Wisner and his colleagues portrayed an example between structural adjustment of policies of the 1980s and disaster damage in Jamaica (Wisner et al. 2004). According to their research, in the 1980s, when the Jamaican government intervened with the financial sector to try to reduce inflation because of its large foreign debt, interest rates and home mortgage rates progressively increased. This situation, coupling with the government's enforced rent control and high tax duties on construction material, led to a rapid decline in residential construction. As a result, homeowners, who were faced with higher mortgage rates and were unable to increase their rents, simply ignored maintenance leading to an immediate increase in the vulnerability of a significant proportion of Jamaica's population. Subsequently, as Wisner and his colleagues report, the 1988 Hurricane Gilbert damaged more than 100,000 low-income homes, destroying or severely damaging 28,000 homes of the poor (ibid., 78-79).

2.2 Rising Exposure, Changing Risk Trends, and Advances in Risk Management

In addition to the increasing vulnerability due to the rising poverty and inequality in certain regions and nations of the world economy, the advanced and affluent nations, regions, or cities of the new global economy have increased their exposure particularly due to the increased infrastructure and technologies and their vulnerability due to the dependency on these "lifelines" (UN/ISDR 2002, 7). This is supported with the argument that "in spite of growing investments in risk reductions" in rich economies, there has been as increased economic damage from natural disasters (Hallegatte 2011, 1). Such a case was observed in the 2011 Tohuku Earthquake and Tsunami in Japan, which alone claimed about 20,000 lives and cost $210 billion in economic damages (CRED 2012, 1). According to Hallegatte (2011, 16), strict building norms in Japan could easily let the nation cope with frequent earthquakes that would cause disasters in another part of the world. However, due to "higher investments in at risk areas, exceptional earthquakes like the Tohuku earthquake can lead to immense losses."

Moreover, the neutralization of distance with new technologies and reduced cost and time—or what David Harvey (2000, 63) called as "the shift in cost of overcoming space"— supported the transnational mobility of capital and people, and disaster risk trends changed with new patterns of exposure and vulnerability. With the new global economy, a disaster affecting a global city or a production center no longer contain damages only to the local economy. The effects of a destructive earthquake in Tokyo may be experienced in New York City through shaky global markets and

investments; or a disaster in a global city such as Los Angeles may affect developing economies like Mexico, where migratory remittances form an important piece of the gross national products and can put the already vulnerable poor into further poverty.

The potential outcomes of increased mobility—in relation to disasters—are not only related to increased economic exposure and vulnerability. As the 2003 *Severe Acute Respiratory Syndrome* (SARS) scare has shown, the increased mobility of people can spatially enlarge the scale of epidemics, or may generate new forms of diseases through mutation in different environments, requiring a new understanding of disaster risk management.

Despite its negative impacts on global vulnerability and exposure, the globalization process has also helped shape new disaster risk management opportunities. The informational revolution facilitated the global transference of technologies and knowledge. This possibility helped researchers and practitioners exchange ideas and data on disasters and disaster reduction techniques. In addition to enabling better monitoring and forecasting of certain types of disasters such as hurricanes, new informational technologies have also enhanced the early detection of medium-term climatic conditions like El Niño; and are expected to contribute to warnings of long-term hazards associated with climate change (UN/ISDR 2004, 1:358-83).

Rapid spread of global communications and the formation of mass media have also had significant impacts on the announcement of disasters in real time, and assisting in the delivery of international aid for emergency response efforts together with transportation systems. These beneficial impacts of contemporary globalization indicate that globalization need not be a cause of vulnerability, but can help provide opportunities for the enhancement of lives of millions of people. On the other hand, countries that were left behind in the global economy, also had a "poverty of connections,"[10] and could not take advantage of the technological developments and what they offer for disaster risk reduction.

2.3 Quantitative Analysis

2.3.1 Regional Polarization and Disaster Statistics

[10] According to Stephen Graham (2002), "poverty of connections" refers to the digital divide that puts people and groups in "a subordinate position," undermining them "to tap into and benefit from dominant and technological and economical processes."

The following graphs compare the distribution of the share of number and impacts of natural disasters in the so-called "triad" region, consisting of North America[11], European Union countries, and the Asia-Pacific[12] region, with that of rest of the world for the periods of 1960-1979 (pre-globalization) and 1980-1999 (globalization).

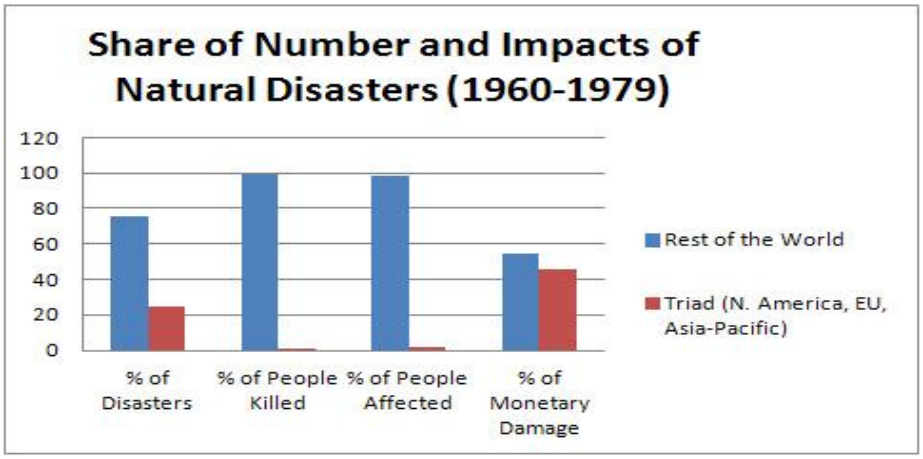


Fig.2.1. Distribution of Disasters and Disaster Impacts (1960-1979)[13]
Data source: EM-DAT: The OFDA/CRED International Disaster Database. www.em-dat.net - Université Catholique de Louvain - Brussels – Belgium

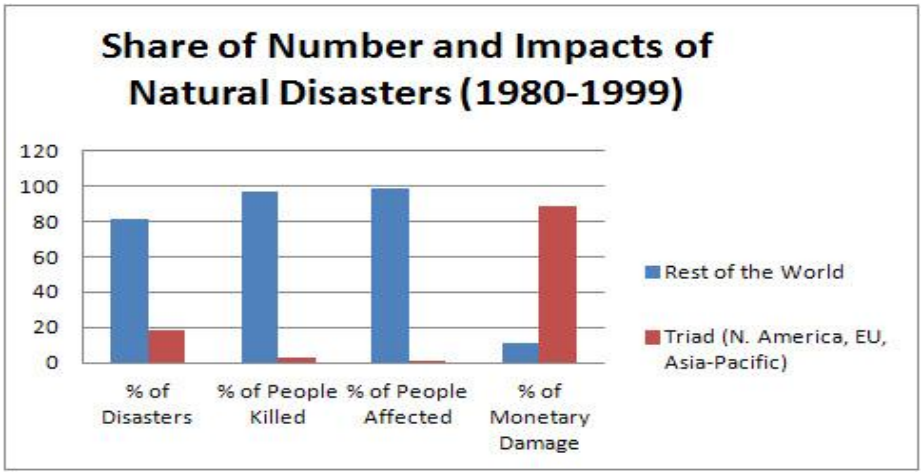


Fig.2.2. Distribution of Disasters and Disaster Impacts (1980-1999)
Data source: EM-DAT: The OFDA/CRED International Disaster Database. www.em-dat.net - Université Catholique de Louvain - Brussels – Belgium

[11] Including United States and Canada

[12] Including Japan, Hong Kong (China), Taiwan and Korea

[13] All graphs in this paper are prepared by the author using raw data from the sources indicated in the methodology.

An examination of the share of number of disasters, of people killed in disasters, and of people affected in disasters, indicate that the shares are approximately remain the same for the pre- and post globalization eras, with the higher share of distribution in the number, people killed and people affected taking place in the more impoverished regions of the world both periods. However, there is a big difference in the distribution of the share of monetary damage due to natural disasters. While the distribution of share of monetary damage due to natural disasters was close to equal in both regions and slightly larger in the rest of the world (54 and 46 percent respectively) in the era before globalization (1960-1979), these figures changed dramatically with "the triad" receiving 89 percent of the monetary damage due to natural disasters in the globalized era, between 1980 and 1999 (fig.2.2). It is well apparent in this study that while the affluent parts of the region have experienced far less natural disasters (19 percent), they are inflicted with the larger load of economic damage from natural disasters (89 percent) since the 1980s. Likewise, another study that reported that "rich countries (N. America, Europe and increasingly Asia) incur greater absolute damage" from natural disasters in the recent two decades (WB and the UN 2010, 27), suggests, this could be due to a combination of bigger exposure and better reporting, as well as the due to the lack of comprehensive loss data. [14]

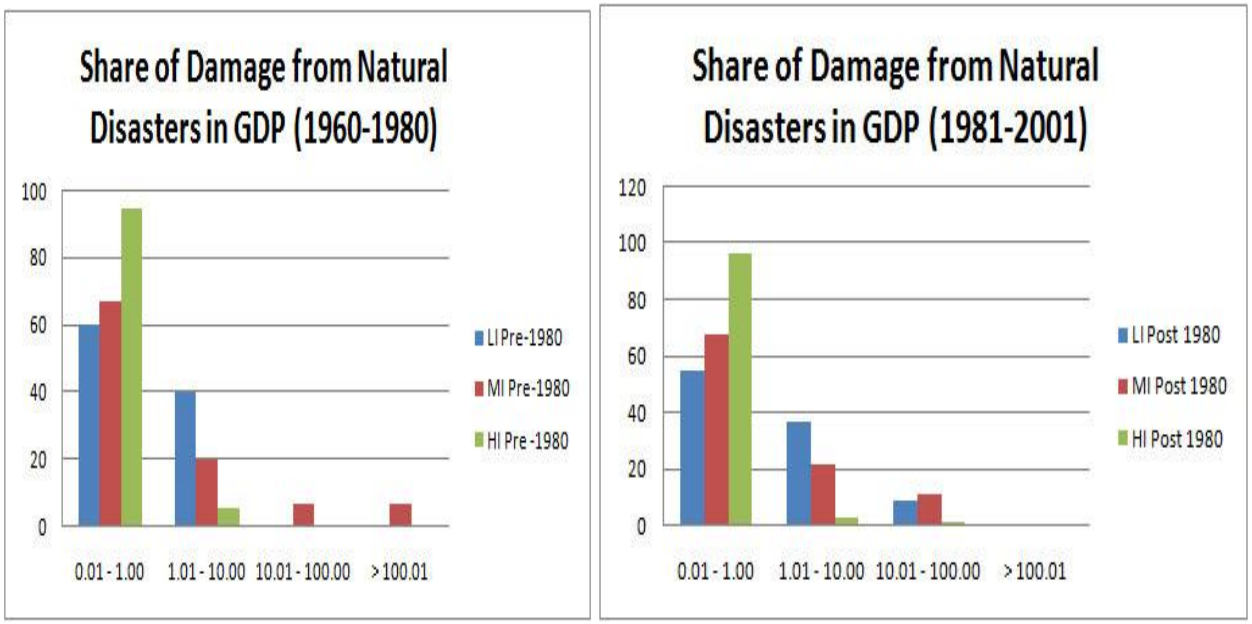
Even though, *vulnerability* is not identical to *poverty*[15], it is integrally related with it. As the 2010 Haiti earthquake demonstrated, when natural hazards are coupled with the impoverished and excluded regions of the global economy with ineffective institutions, severe consequences arise. In figures 2.3 and 2.4 that compared the share of damage from natural disasters to the Gross Domestic Product (GDP) of the Low- , Middle- and High-Income Countries, for the period before and after 1980, it is observed that for the high income countries in both periods, before and after 1980, the share of damage from natural disasters has predominantly equaled to 0.01 to 1 percent of their GDP, except for rare but large scale

[14] It should be noted that this study used monetary damage reported in EMDAT/CRED without adjusting it for inflation, and that the available data may not be ideal to conduct an economic loss analysis, for EM-DAT registers events as disasters if they produced 10 or more deaths, affect 100 or more people, or where a situation of emergency was declared or a call for international assistance was made. Losses associated with small-scale but frequent disasters, especially those that impact poor nations, remain below these thresholds and are therefore not documented (de la Fuente et al. 2008, 39).

[15] This paper uses the World Bank's definition of poverty as an unacceptable deprivation in human well-being; which goes beyond the traditional view as measured by income or consumption; but that includes basic material needs including adequate nutrition, health, education, and shelter as well as social needs including security and empowerment (WB 2000; Ames et al. 2002).

disasters[16]. Whereas for low and middle income countries, the share of damage from natural disasters, since the 1980s, has increasingly taken more than 1 percent of their GDP, between 1.01 to 10.00 percent and even more than 10 percent of their national economies. As was stated by T. J. Andersen (2003, 59), "[e]conomic growth rates typically hover around 1 to 3 percent annually, so a direct-loss impact of 5 to 10 percent of GDP can have an abrupt effect on a country's economic development." Therefore, despite the fact that higher income countries have observed larger share of absolute damage from natural disasters since the 1980s (fig 2.2), the low- and middle-income countries have observed a larger impact in their GDP's, indicating that the already disadvantaged lower income economies have increasingly suffered more from natural disasters.

Fig. 2.3 and 2.4: Interregional Inequality: Observance of Years in Share of Damage from Natural Disasters in GDP: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries

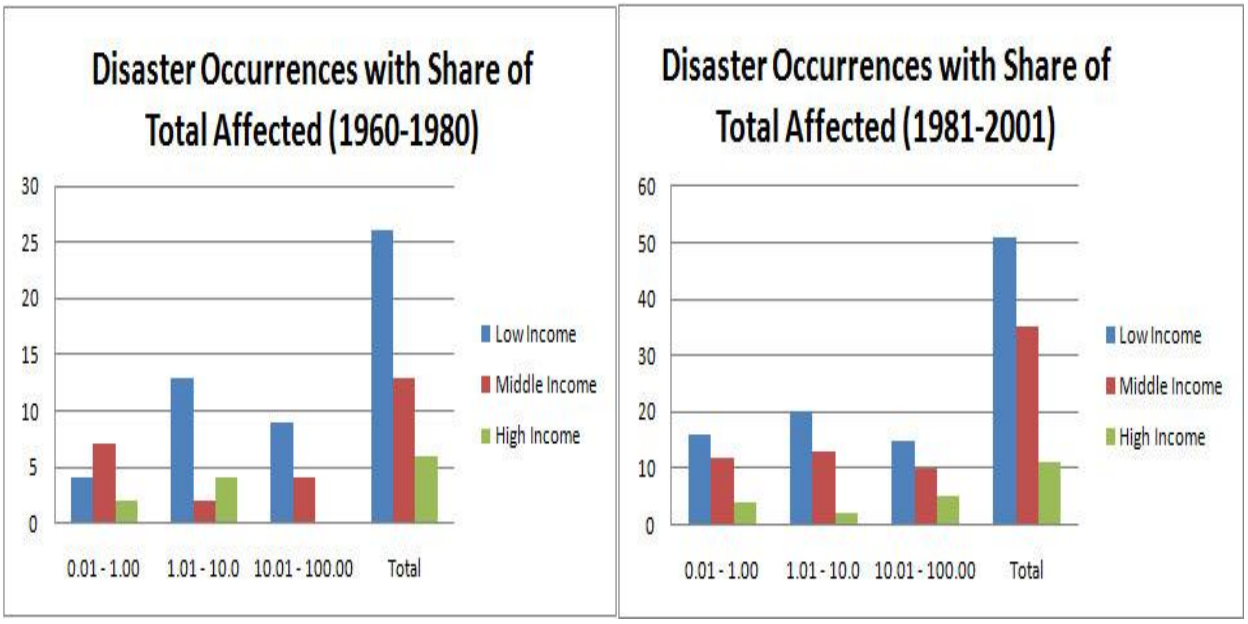


Likewise, the figures that examine the share of the total affected population in total population of countries indicate that there are more occurrences when all the nations are experiencing a large portion of their population affected from natural disasters, with the share of affected population higher in low- and middle- income countries. This could be due to a) an increase in the number of disaster occurrences since the 1980s, b) better reporting of disasters and affected population, and c) increase in

[16] Such as with Hurricane Katrina, where the monetary damage with US$125 billion was equal to 12 percent of the US GDP in 2005. On the other hand, the monetary damage from Haiti earthquake was equal to 120 percent of Haiti's GDP in 2009.

exposure due to population increase, and d) increase in vulnerability due to settlement of population in hazard-prone areas and other factors. It has been observed that developing nations are affected with frequent but low-scale disasters, such as flooding in South Asia. The increase in hazard events, combined with increase in vulnerability and exposure would explain the higher share of affected population in low- and middle- income countries.

Fig. 2.5 and 2.6: Interregional Inequality: Observance of Years in Share of Damage from Total Affected in Population: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries[17]



2.3.2 Changes in the Economy, Job Mismatch, and Income Inequality

As "[t]he impacts of economic adjustment measures to encourage greater efficiencies and global competitiveness resulted in shrinking job markets" (UN/ISDR 2004, 1:61), and the income polarization due to the formation of new services and decline of old economies between regions and within national and urban economies grew, poverty gap and income inequality increased.

The following two figures show the changes in services and agricultural sectors in the low-, middle-, and high- income countries since the 1980s. An examination of pre-1980 and post-1980 share

[17] Due to their uneven numbers, the study recalculated values of low-, middle-, and high-income countries in the study, to produce even results.

of services and agriculture sectors indicate the increasing share in services sector and the decreasing share of agricultural sector in all income countries since the 1980s.

Fig. 2.7 and 2.8 Observance of Years with Share of Services Sector in GDP: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries[18]

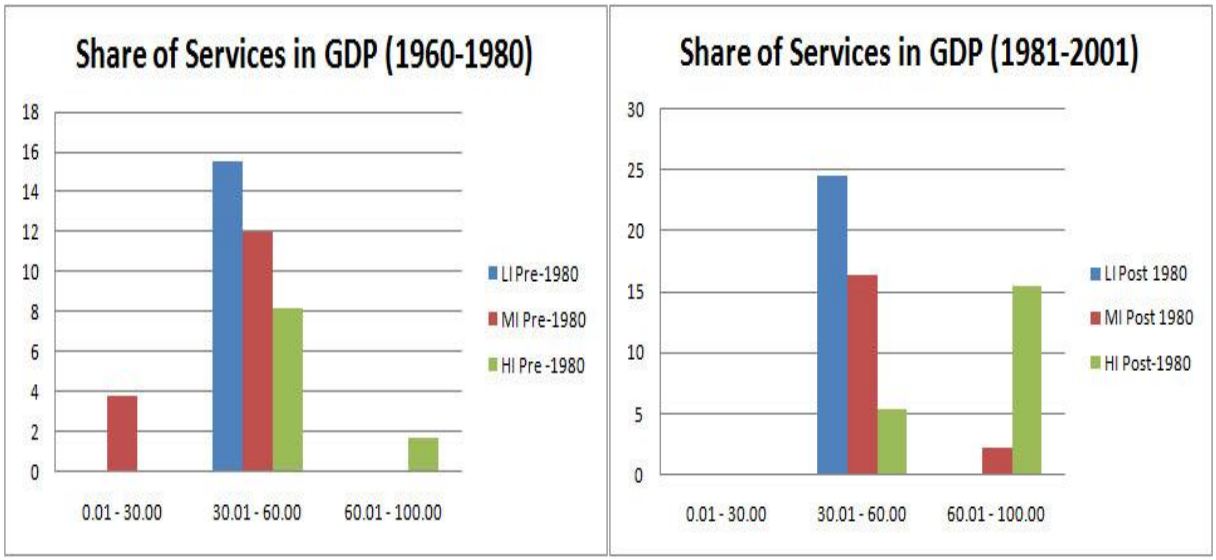
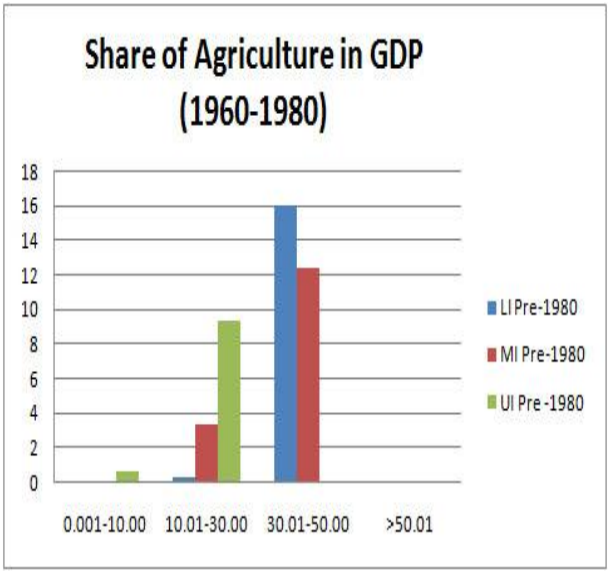
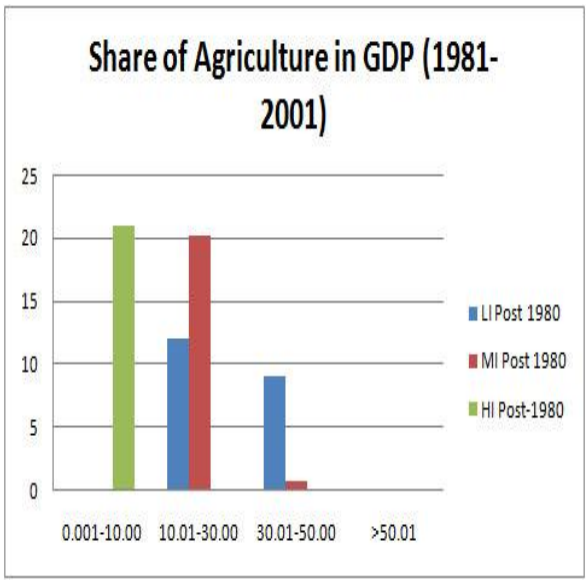


Fig. 2.9 and 2.10 Observance of Years with Share of Agriculture Sector in GDP: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries

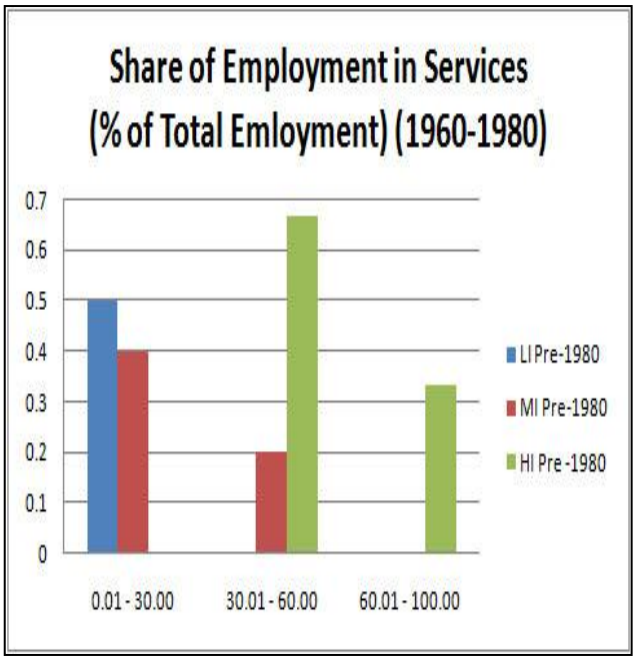
[18] Due to the unequal number of countries in each income group, data in all y-axis have been recalculated to show the share for a single country.





Employment in Agriculture and Services

Fig. 2.11 and 2.12 Observance of Years with Share of Employment in Services Sector: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries



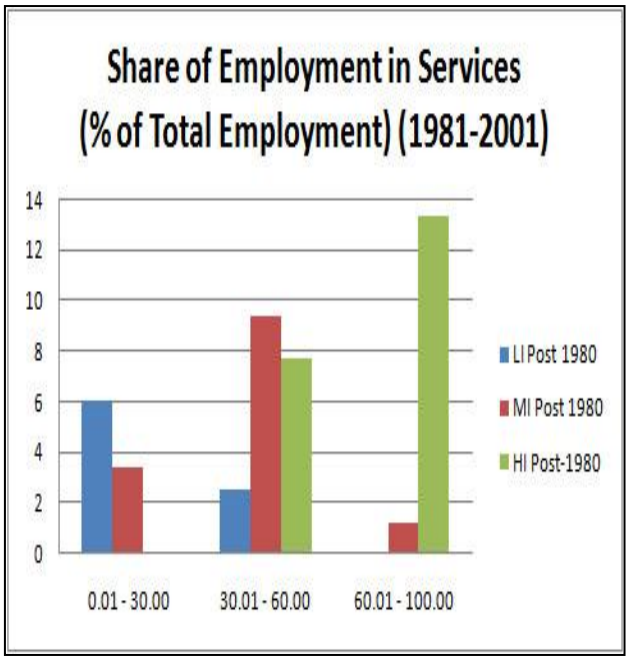
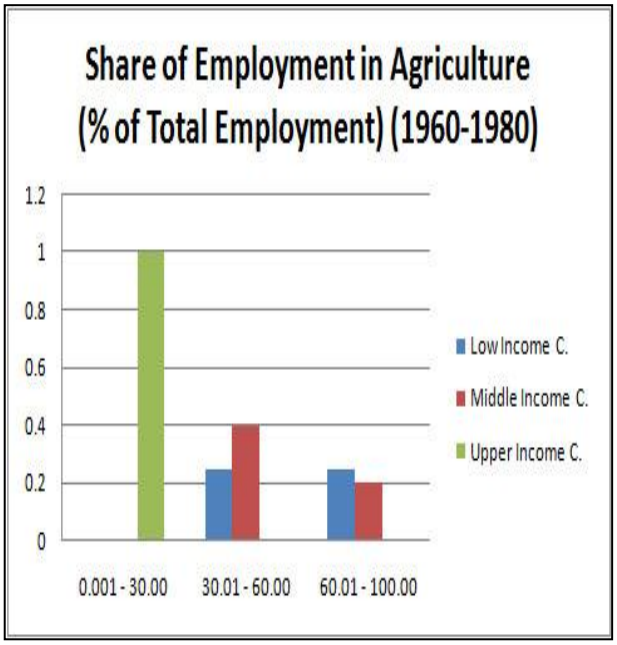
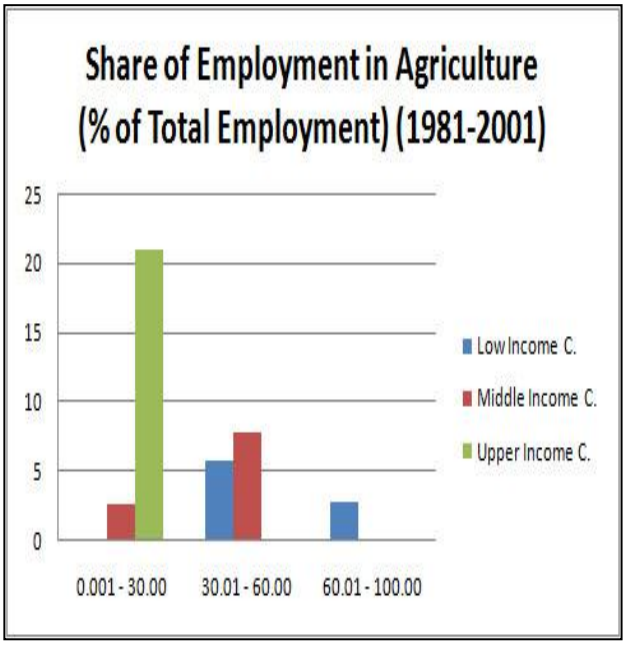


Fig. 2.13 and 2.14 Observance of Years with Share of Employment in Agriculture: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries





The above two figures show the changes in the share of employment in services and agriculture sector in low-, middle-, and high- income countries since the 1980s. It should be noted that due to lack of data before the 1980s, a meaningful analysis cannot be accomplished to suggest differences between pre- and post-1980 figures. On the other hand, an examination between figures 2.3, 2.4, 2.5, and 2.6 indicate that since the 1980s, the share of services sector in GDP of all nations have risen, on the other hand, this is disproportionate to the share of employment in services in low-income countries. This is contrary to the situation in agriculture. Despite the low share of agriculture in GDP of nations, the share of employment is very pronounced in low-income countries that may indicate rising poverty in rural areas in low-income countries with the new global economy.

Poverty, Income Inequality and Disaster Vulnerability

There are a number of studies that present the relationship between poverty and disaster vulnerability. A background report for the 2009 GAR on Disaster Risk Reduction asserts that "[p]oor communities are the most vulnerable to natural hazards from all points of view" (Corrales and Miquilena 2008, 7). It has been recognized that "[f]or poor households constrained by their assets and the conditions they face to transform them into valuable instruments to achieve wellbeing, this constant rearrangement of

strategies and conditions can also render them more likely to bear the brunt of natural disasters" (World Bank 2000).

The author's quantitative research on poverty and income equity levels of 20 countries and their vulnerability from natural disasters during 1960-2004 indicated the following results: Poverty gap[19] statistics indicate that in observed years, countries with higher poverty gap levels had higher human losses and higher affected population rates than those countries with lower poverty gaps. On the other hand, countries with low poverty gap levels had higher monetary damages, which indicate either occurrences in high-income countries or a decrease in poverty gap levels

As for income inequality, there are slight differences with poverty gap and vulnerability correlations. Calculations on national GINI indexes[20] indicate higher human losses in locations with higher income inequality, and higher number of affected and monetary damages in locations with lower income inequality. The correlation of higher monetary damages and less income inequality is expected to signal higher income countries on the so-called "triad." On the other hand, correlations of higher number of affected and lower income equality may suggest middle-income countries; but may also be due to a very low number of occurrences and thus may not be entirely an accurate observation (Gencer 2007, 112; Gencer 2008, 218-225).

Case Study 1: China

Putting the above arguments of sectoral changes, job mismatch, rising inequality and vulnerability together, an examination of a rapidly growing middle income country such as China will indicate the following: Despite the decrease of the share of agriculture sector in the GDP and the increase in the change of shares of services since the 1980s[21], more than 60 percent of the population still lives in rural areas in China. Even though the poverty head count ratio at $1 a day (% of population) is decreasing since the 1980s, the GINI Index is steadily increasing, indicating the growing inequality within the country in the era of globalization. Taking into consideration the arguments that countries with higher

[19] Poverty gap at 1$ a day is the mean shortfall from the poverty line, expressed as a percentage of the poverty line. It is actually $1.08 at 1993 prices. The World Bank uses "Purchasing Power Parity" exchange rates for consumption to convert international poverty lines into local currencies (WDI).

[20] According to World Bank descriptions, GINI index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A GINI index of 0 represents perfect equality, while an index of 100 implies perfect inequality (WDI).

[21] The red line in the graphs separates pre and post 1980 era.

poverty gap and GINI indexes have higher human losses from disasters, it is possible to argue that for China vulnerability to natural disasters has been increasing in the era of globalization.

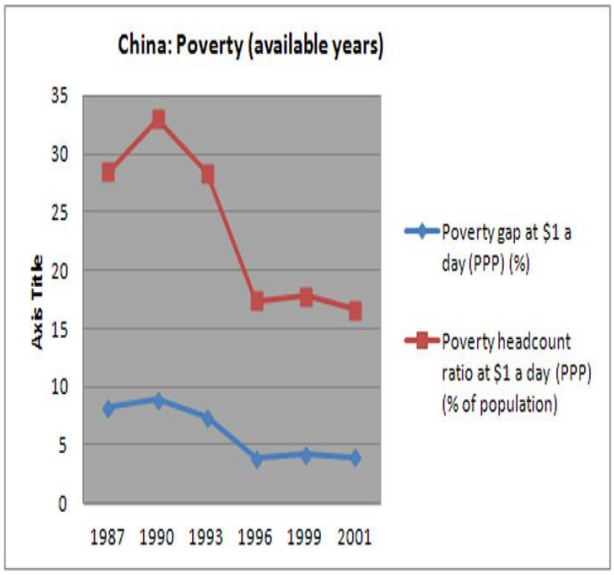


Fig. 2.15 China: Poverty Levels

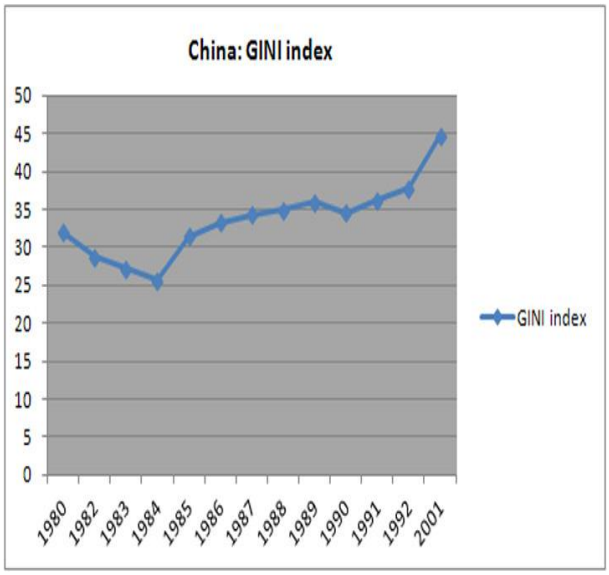


Fig. 2.16 China: GINI Index

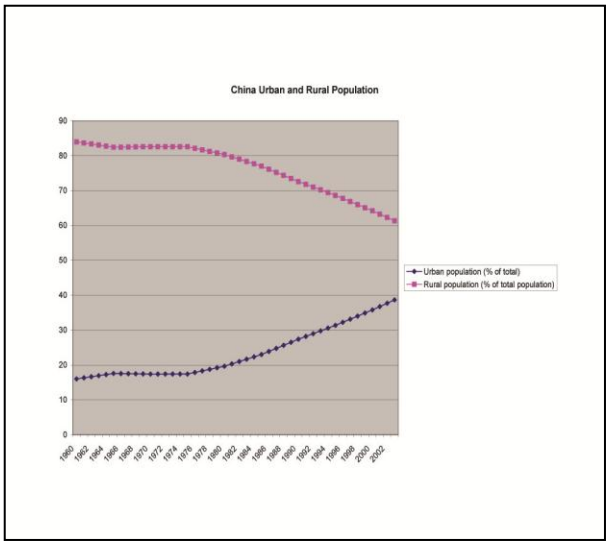


Fig. 2.17 China: Urban and Rural Population as Share of Total Population

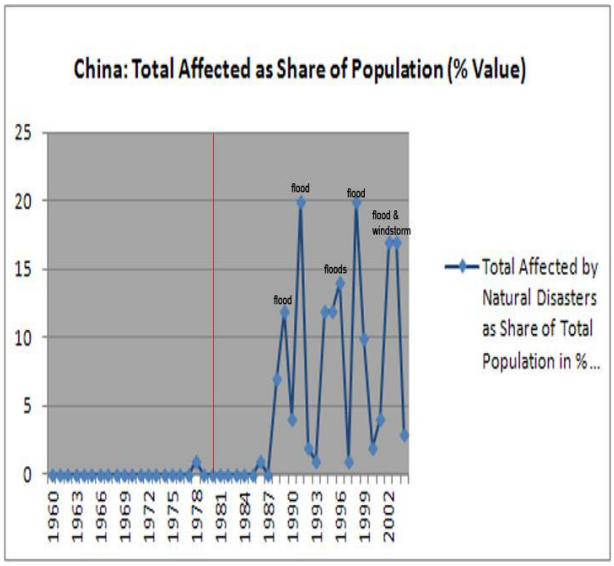


Fig. 2.18 China: Total Affected from Natural Disasters

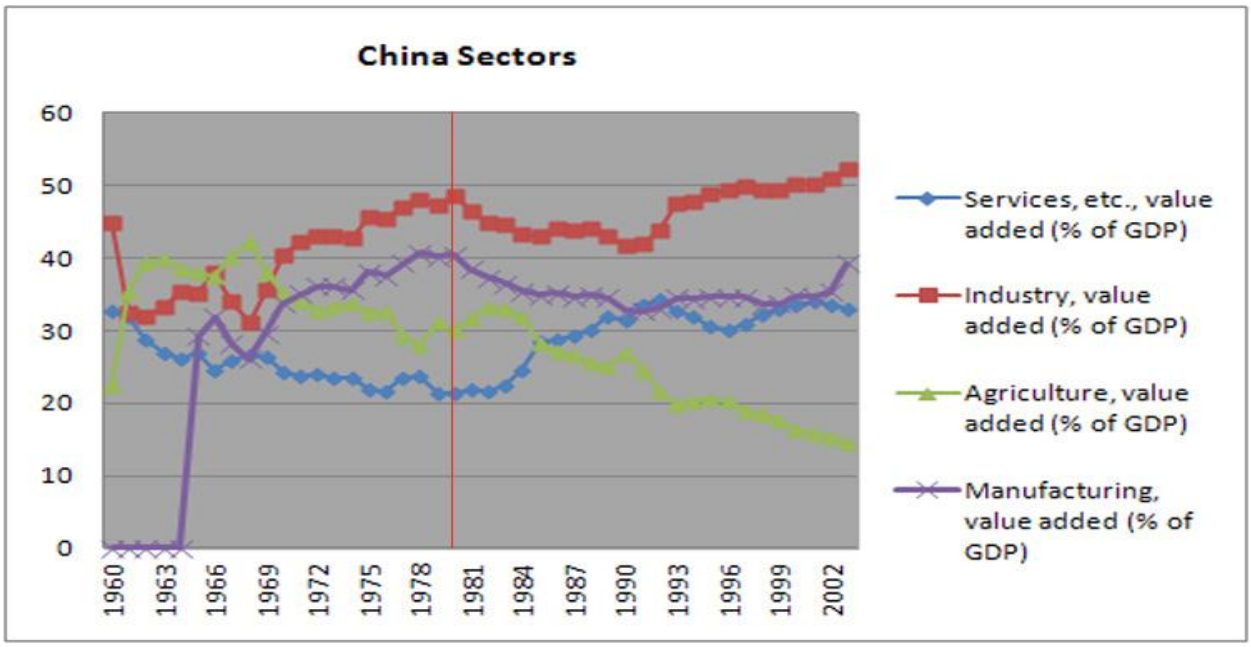
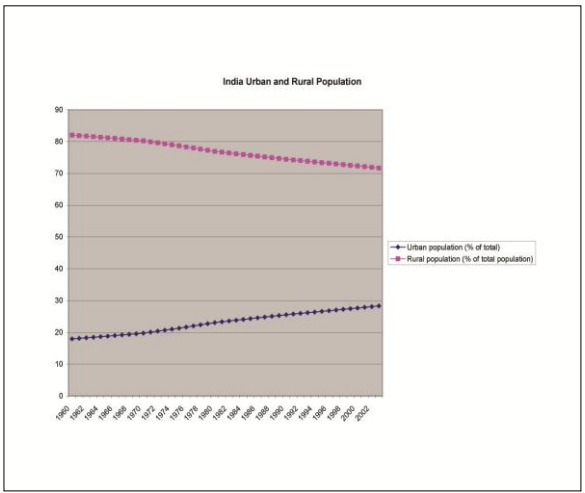


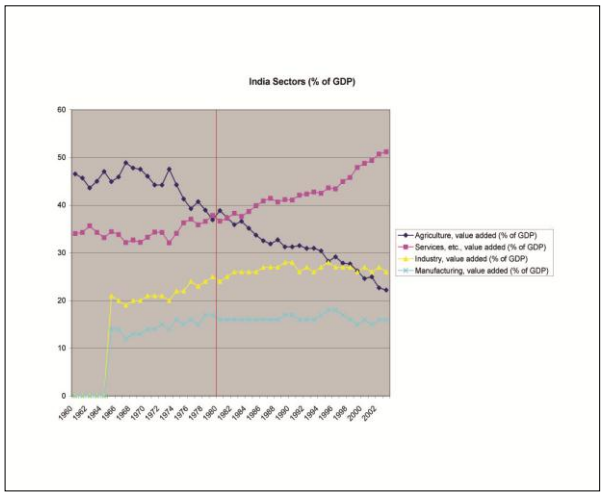
Fig. 2.19 China: Sectors

Case Study 2: India

As in China, in India, most of the population still lives in rural areas, and the population density in rural areas continues to increase at a higher rate than in urban areas. Therefore, even though the share of agricultural production in GDP has given its way to the service sector, especially since the 1980s, a higher percent of the population continues to be impacted by natural disasters such as droughts and floods, while droughts have a lesser impact on the economy.

On the other hand, even though the aggravated amount of disasters in single years impact the





economy, when the 2001 Gujarat earthquake affected the regional commercial center of Ahmedabad, it caused the highest damage from natural disasters in India, even though it had affected less than 5 percent of the population.

Fig. 2.20 India: Urban and Rural Population

Fig. 2.21 India: Sectors

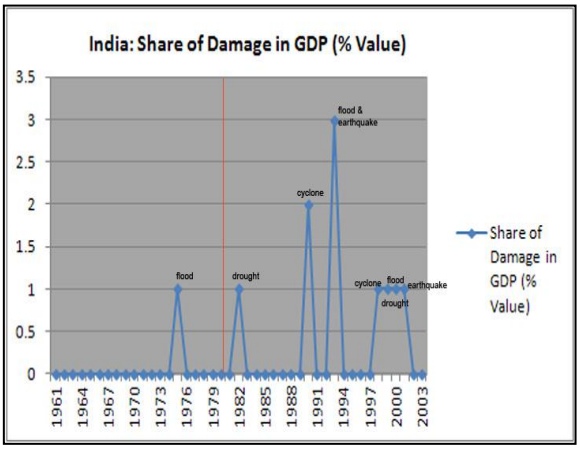


Fig. 2.22 India: Share of Damage in GDP Share of Total Population

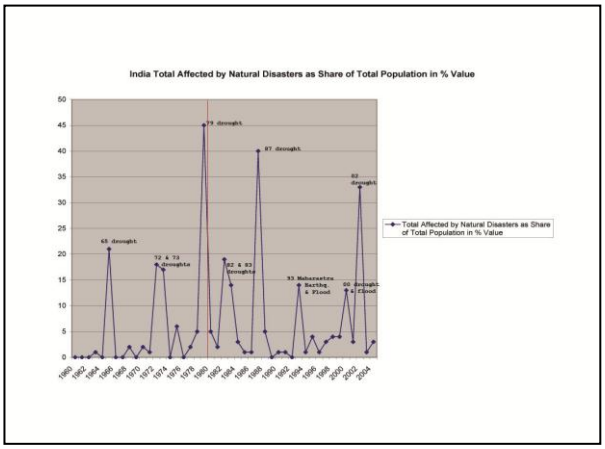


Fig. 2.23 India: Total Affected by Natural Disasters as

2.3.3 Technological Divide and Vulnerability

The following figures show the observance of internet use per 1,000 people in low-, middle- and high-income countries, indicating the technological divide between the low- and high-income countries, especially in the subject of internet connectivity. On the other hand, to the author's knowledge, there are no correlative studies indicating the relation between technological development and disaster vulnerability. The two case studies below are examined to demonstrate the differences between a globally connected and technologically developed high income economy (USA) versus a low-income economy (Honduras) that has not gained from the technological developments of the global economy, that are both affected by seasonal hurricanes. On the other hand, these figures are not conclusive to make an argument that technological divide would increase vulnerability from natural disasters. On the other hand, the share of internet users in a nation would show the institutional and technological development in a nation and is an indicator of sustainable development. In the indicator of airport departures, differences between the size and population of two nations should also be taken into consideration.

Fig. 2.24 and 2.25: Observance of Years with Internet Users (per 1,000 people): Comparison between the periods 1990-1995 and 1996-2001 in Low- , Middle- and High-Income Countries

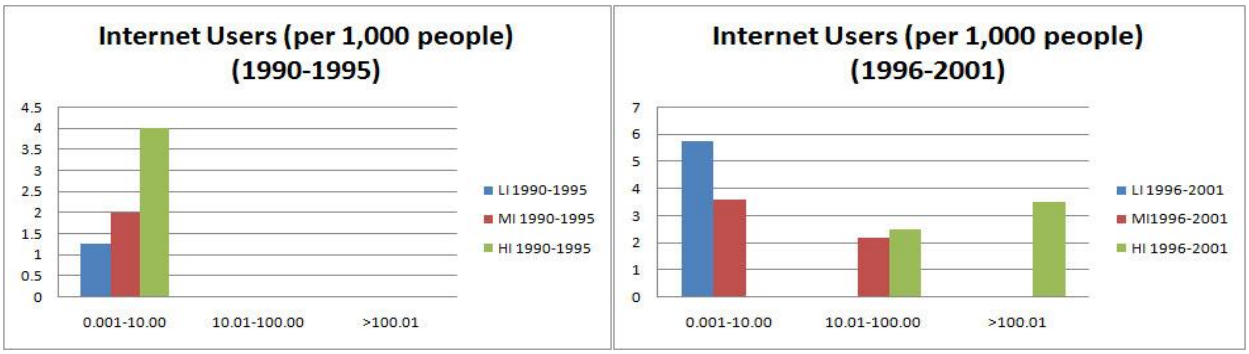
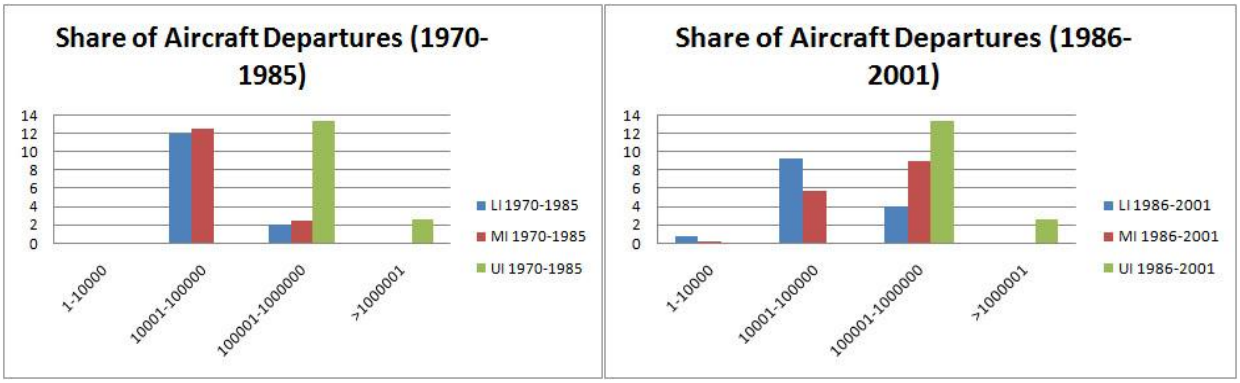


Fig.2.26 and 2.27: Observance of Years with Aircraft Departures: Comparison between the periods 1970-1985 and 1986-2001 in Low- , Middle- and High-Income Countries



Case Study 3: Honduras

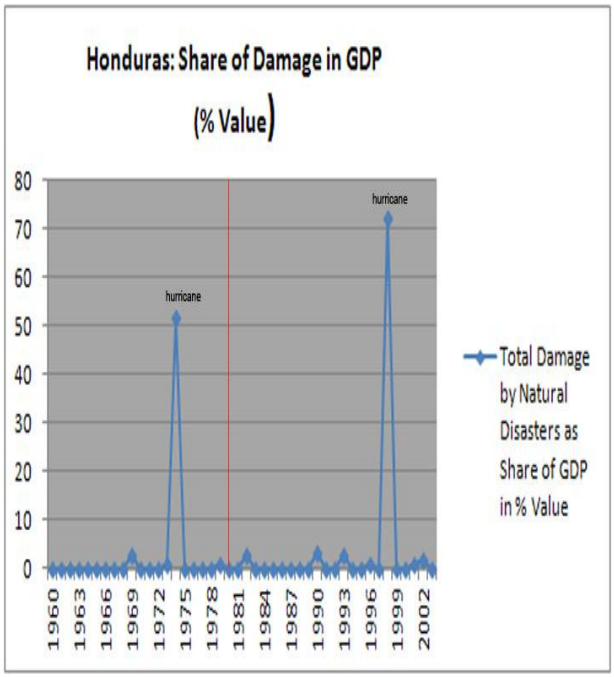


Fig. 2.28 Honduras: Share of Damage in GDP

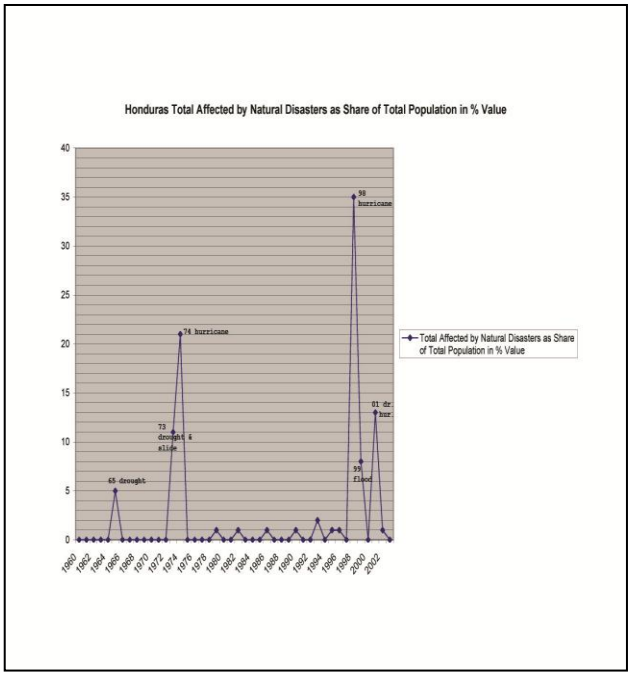


Fig. 2.29 Honduras: Share of Total Affected in Total Population

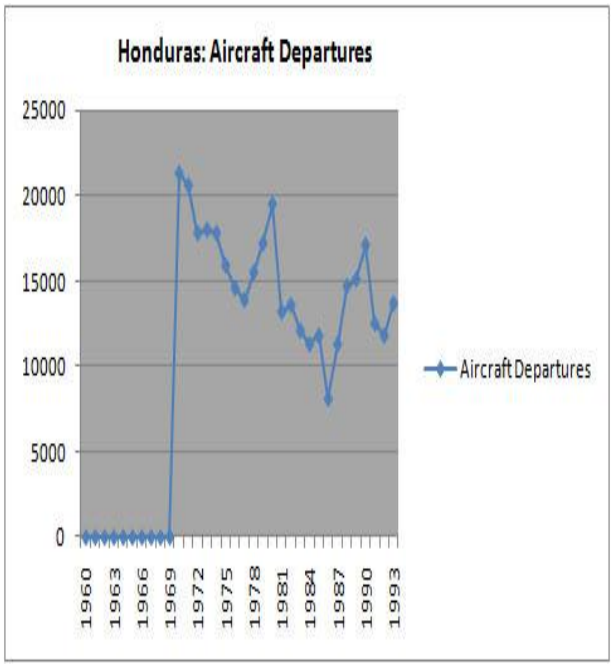


Fig. 2.30 Honduras: Aircraft Departures

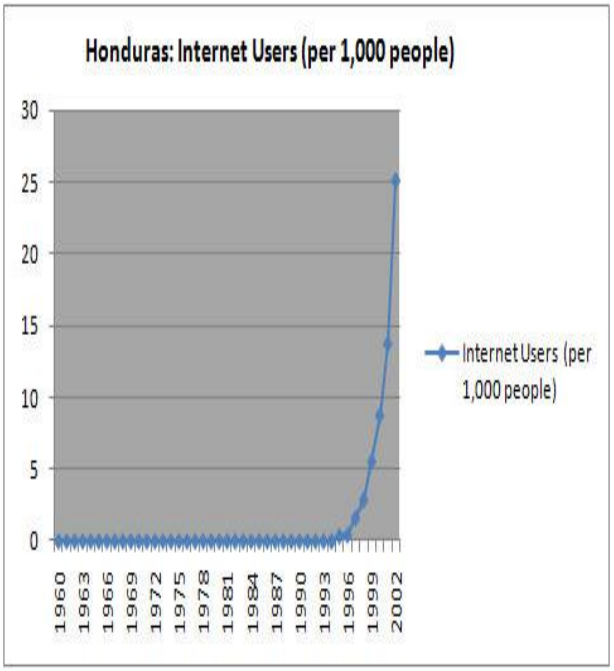


Fig. 2.31 Honduras: Internet Users

Case Study 4: USA

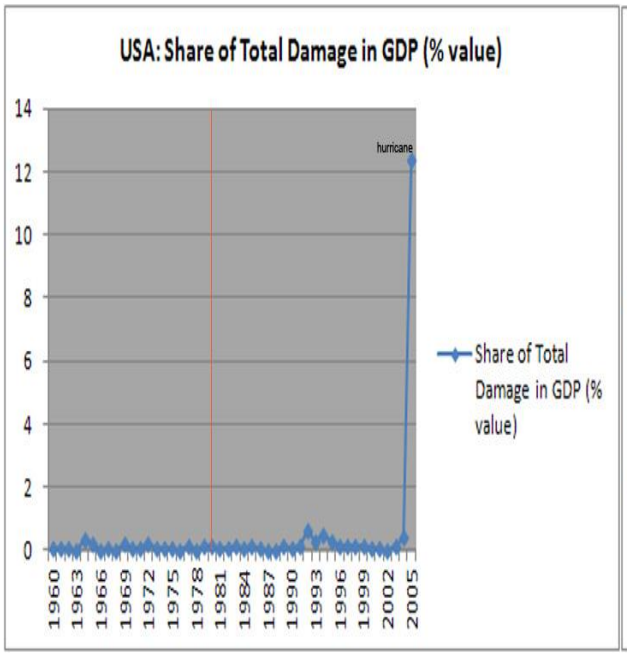


Fig. 2.32 USA: Share of Damage in GDP

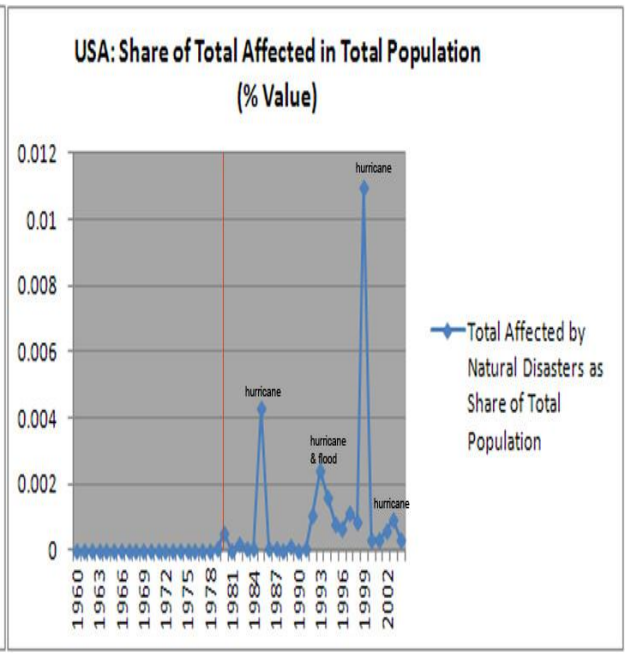


Fig. 2.33 USA: Share of Total Affected in Total Population

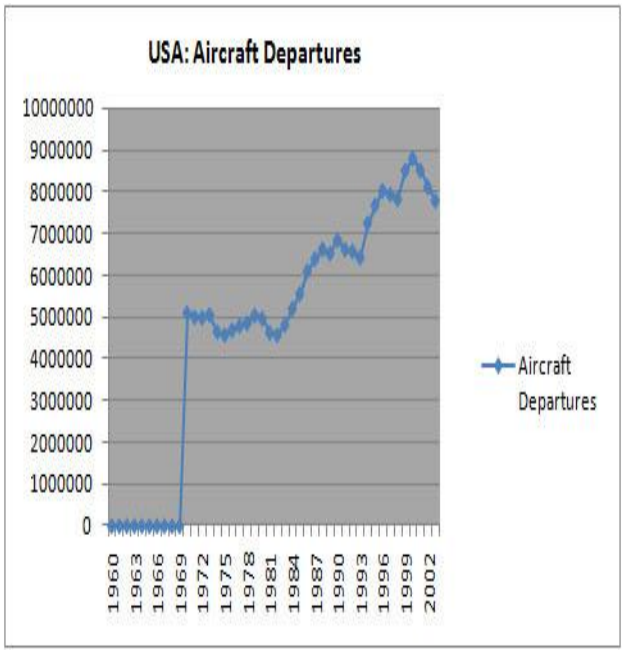


Fig. 2.34 USA: Aircraft Departures

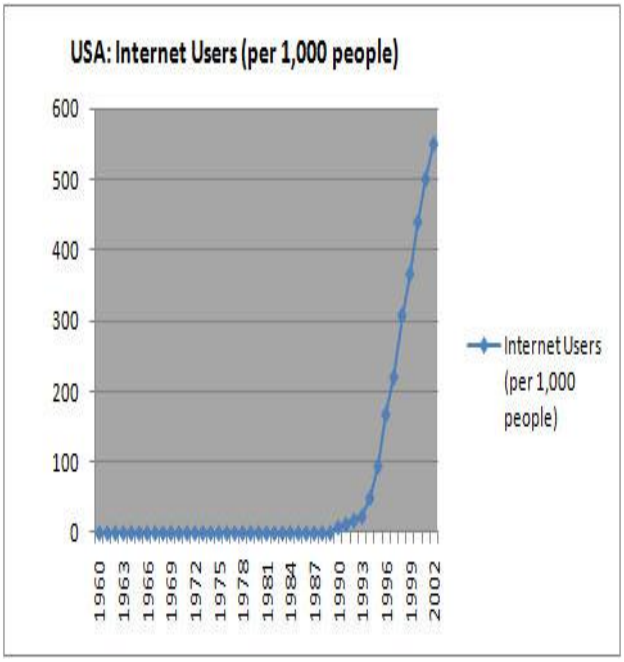


Fig. 2.35 USA: Internet Users

3. **Globalization and Disaster Risks in the Urban Realm**

The process of globalization is expected to have changed disaster risk patterns in urban areas in a number of ways. First, just like the global economy, economically dominant cities acquired wealth and assets, increasing their exposure. In the dominant cities, inequality between the new rich classes of the new global economy and the rising unemployed that worked in the old economies increased, rising socio-economic and spatial inequality and vulnerability in the city. Additionally, to serve and to acquire from the benefits of the new global economy, the impoverished rural segments of the national population migrated to the dominant urban areas creating large- and mega-cities and settling in poorly made constructions in informal settlements, mostly in the peripheral areas of the urban areas, increasing both exposure by population increase and vulnerability due to physical conditions of living. Unfortunately, the increasing exposure and vulnerability in large- and mega-cities are coupled with hazards, as evidence shows that all megacities are exposed to natural hazards ranging from geological (earthquake ground shaking and mass movements) to meteorological (floods and storms) and climatic events (extreme heat and cold), indicating the rising disaster risks in the urban realm. The following sub-sections examine direct or indirect effects of globalization in urban areas: rising exposure due to

increase in the concentration of population, wealth and assets; rising vulnerability due to substandard conditions of living, rising inequality, changes in the urban form, and lack of good governance practices.

3.1 Changes in the Urban Form and Increasing Inequalities

In the 1980s, with the new global economy, while a few major cities, such as New York, London and Tokyo, started to function as the "command and control centers" to the globally integrated financial markets and other cities became the sites of new types of production, a larger number of other cities, such as Detroit or Manchester, lost their role as leading export centers for industrial manufacturing (see Sassen 1991, and Harvey 1996).

With the emergence of new growth poles resulting from the internationalization of production and "the trend towards the continuing growth of mega cities and primacy[22]" (Sassen 1994, 51), some national capitals, such as Rio de Janeiro[23] lost central economic functions and power to the new global cities, such as Sao Paulo, whose role strengthened with the growth of foreign direct investment (ibid). As "[t]he impacts of economic adjustment measures to encourage greater efficiencies and global competitiveness have commonly resulted in shrinking job markets" (UNISDR 2004, 1:61), and the connection to the global economy by a few major centers brought widespread poverty in developing economies, new forms of inequality and informal economies started to take shape (see Sassen 1998).

The emerging new urban form with the start of the new global economy in the late 1970s, have been defined with characteristics such as "the new fragmentation of the city space; the shrinkage and disappearance of public space; the falling apart of urban community; separation and segregation; and the exterritoriality of the new elite and the forced territoriality of the rest" (Bauman 1998, 23), as well as "the growth of an informal economy; high-income commercial and residential gentrification; and the sharp rise of homelessness" (Sassen 1998, 100). Both Sassen's and Bauman's, along with other theorists' assessments point to a disintegration within the city in the 1980s, as a consequence of social and economic restructuring due to the shift from manufacturing to services sector (see Sassen 1991, 1994; Fainstein et al. 1992, Mollenkopf and Castells; and Harvey 1990) and the mismatch of job and labor

[22] Primate urban system is "an urban system where one city, typically the national capital, concentrates a disproportionate share of the population and of economic activities" (Sassen 1994, 156).

[23] For instance, according to the UN numbers, the population of Rio de Janeiro was 10.8 million and is expected to be 12.6 million by 2020 numbers, while in 2000, Sao Paolo had a population of 17 million people and according to the estimates and projections, it is expected to be 21.6 million by 2020 (UN-DESA 2009).

availability, which resulted in rising rates of unemployment (Kasarda 1996) and emerging new inequalities within cities.

The rising characteristics of the new socio-economic restructuring affected the spatial dimension of the city by changes in the land-use patterns, the socio-spatial distribution of residents, and the changing extent of segregation with new forms of the built environment. Increasing inequality between housing for the rich and housing for the poor was a result of the inefficient role of government agencies such as the deregulation of home mortgage finance and its integration with the globally organized money and capital markets (Fainstein et al. 1992, 176), with the increasing influence of the real estate market in the new global economy.

In the new polarized urban spaces, deteriorated inner-city slums, ethnic enclaves, and gentrified neighborhoods stand side-by-side, leading to questions as to how the rising inequality between urban residents and market-based decisions of local governments will affect disaster vulnerability and risk reduction strategies; or the role of privatized public spaces in the aftermath of disasters. Answers to such questions need to be explored for a full comprehension of the socio-spatial changes due to the global economy since the late 1970s and its effects on socio-spatial inequality and rising vulnerability in urban areas.

3.2 Increasing Exposure, Urban Vulnerability and Lack of Institutional Capacity

Since the 1980s, rapid urbanization[24]patterns due to population shift from impoverished rural economies[25] led to the increase in the exposure of population living in hazard- prone urban areas, especially in large- and megacities of the developing countries. In the nations that could not offer alternative development or settlement opportunities, the exclusion of the incoming populations from formal housing sectors resulted in the expansion of urban areas and the creation or expansion of unplanned informal settlements. Observations suggest that "immigrants of poor households seeking to

[24] In simplest terms, *urbanization* is an increasing proportion of a population living in settlements defined as urban centers (Satterthwaite 2005: 2). The immediate cause of most urbanization is the net movement of people from rural to urban areas (which is mostly higher than urban to rural migration). It is important to point out that national governments set their own population benchmarks to define what constitutes an urban area. Therefore, the scale of the world's urban population may vary according to different national standards.

[25] This is due not only to the shrinkage in agricultural sectors and the possibility of new job opportunities in urban areas, but also due to available amenities and education opportunities for children, as well as many times due to escape from civil-war or clash in many nations.

escape poverty in rural areas often arrive into or form urban squatter settlements, where land value are lowest and where the pressing need to acquire housing and basic services translate into sub-standard urbanization, characterized by unsafe-dwellings, precarious or non-existent public infrastructure, and overcrowding (de la Fuente et al. 2008, 2). In many cases, with urban spatial growth, formerly independent administrative and political units of settlements have incorporated with metropolitan cities; creating peripheral municipalities and generating new challenges in urban governance. Along with conditions of urban poverty, informal economy, and challenged urban management systems, informal settlements and their residents have become increasingly susceptible to vulnerabilities from natural disasters (Gencer 2007, 124).

In many informal settlements and peripheral municipalities, vulnerability to natural disasters does not end with physical exposure or social fragility. Lack or inefficiency of public urban services and institutions—transportation networks, hospitals, fire- or police stations—translate into *lack of response capacities* at times of disasters. Insecure land titles obtained through developers add to the impossible disaster recovery of these settlers, who can neither obtain government aid nor credit with their illegal titles. Social exclusion, ethnic or immigrant status, poor education and limited job opportunities add to the income poverty of these residents, limiting their mobility and resettlement and creating one of the biggest challenges for urban policy making in the developing world (ibid. 127).

It is expected that there is a strong tie between vulnerability and urban poverty[26], and that an understanding of urban poverty encompassing both economic and non-economic factors provides insight to disaster vulnerability in urban areas, such as in informal settlements and slums. On the other hand, it is necessary to stress that vulnerability is the combination of interrelated physical, socio-cultural, economic, and institutional conditions. Oversight of control due to inadequacy or corruptions of local governments and officials add to the problem in many urban areas, especially in the housing responses to rapid population growth since the 1980s, where problems usually start with an increase in building activity with an unqualified construction sector and lack of government control. In some cases, locations on geologically hazardous areas intensify or become a direct cause of damages. In other cases, non-adequate applications of building codes or deficient structural configurations are the main cause. Many times, structural configurations are executed after the completion of buildings, as due to the lack of control of government agencies; urban residents try to reconfigure their living spaces without consultation to architects or civil engineers. Addressing the post-1980s urbanization with liberalization

[26] According to the World Bank's Poverty Reduction Strategies, urban poverty is explained with dimensions of income poverty, health and education poverty, personal and tenure security, and disempowerment (Baharoglu and Kessides 2002).

of construction sector and lack of government control or corruption has resulted in severe results as was observed in several natural disasters from the 1999 Marmara/Izmit Earthquakes in Turkey to 2003 Boumerdes Earthquake in Algeria.


Figs. 3.1 and 3.2 Shoring of balconies in vacation homes in Playa d'Aro, Spain; and **a** new construction in the earthquake prone Zeytiburnu district in Istanbul (Photos by author, 2003 and 2004 respectively).

According to the *Earthquake Reconnaissance Report* (EERI 2003) of the 2003 Boumerdes earthquake, one of the highest damage in Algiers occurred in a newly developed urban area and as a result of the changes in the State's role in the construction sector and planning system. In the 1990s, as Algeria was transforming itself from a rigid-state controlled system to a free-market economy, the State made major changes in planning and construction regulations. With the liberalization of construction regulations, an unqualified private sector emerged; hastily developing housing mostly with government oversight and without building permits. According to official data, in Algiers and its vicinity, "in the period during 1990 to 2002, 42.4% to 52.8% of the individual homes were built without a legal title document, and thus without a building permit" (EERI 2003, 5). Most of these developments were along the coastal districts with high real-estate value. The reconnaissance team argues that corruption and personal interventions had interfered with the attention to the quality of construction, resulting in heavy damage to this housing stock (ibid., 3-11).

Likewise, post-earthquake investigations to the Izmit/Marmara earthquakes in 1999 reported that most of the severely damaged or totally collapsed buildings were four to eight stories in height, and they were relatively new; in many cases, they were recently completed reinforced concrete frame

buildings with masonry infill (USGS 2000, 41). Damage to these buildings[27] was attributed to foundation failures, soft stories (mostly used for commercial purposes) with no shear walls, strong beams and weak columns, lack of column confinement eliminating ductility,[28] and poor detailing practices, all corresponding to substandard construction practices and lack of enforcement of building codes (Bruneau 1999; USGS 2000). In most cases, concrete quality was very poor and unacceptably weak; and the presence of seashells in concrete suggested the use of beach sand, observed especially in the destruction of large apartment buildings for lower-middle class summer housing in the town of Yalova.

The "collusion between corrupt contractors and corrupt building inspectors had resulted in lax enforcement" and had "deadly consequences"[29] (Williams 2011, 18). The losses from the two Marmara earthquakes were devastating: around 18,000 people lost their lives and 50,000 people were injured. In the two earthquakes, more than 300,000 housing units and 46,000 business premises were damaged, and 321,000 people lost their jobs (Bibbee et al. 2000, 35). The extensive geographical area affected by the earthquake is considered "the industrial heartland of Turkey," with the most severely affected four cities (Kocaeli, Sakarya, Bolu and Yalova) contributing over 7 percent of the country's GDP and 14 percent of industrial value added at the time (ibid., 1). With the immediately surrounding cities of Bursa, Eskişehir and Istanbul, the affected region had a share of 35 percent of Turkey's GDP, stressing the risk of economic losses and significance of disaster risk to a growing economy like Turkey (ibid., 37).

3.3 Quantitative Analysis

3.3.1 Urban Inequality and Vulnerability

The rising inequality between the rising professionals working in the new employment arena of the new global economy, the unemployed classes of the declining economies, and the new incoming population working mostly in informal services is suggested to have changed vulnerability patterns in urban areas.

In one study, Nejat Anbarci and his colleagues (2005) studies mechanisms affecting earthquake mortality and found that more people died in countries with greater income inequality. In another study that measured exposure of the poor and the non-poor population to natural disasters, the results

[27] In rare cases where steel construction were used (mostly in industrial buildings), damages were attributed to failure of anchor bolts and structural instability (Bruneau 1999).

[28] Ductility is "the property of a material to deform without catastrophic loss of strength" (USGS 2000, 3).

[29] As Gareth Williams previously reported, this view was challenged by Philipp Keefer and his colleagues (2010) who argued that "the typical problem in developing countries is not dishonest building inspectors, but the fact that such inspections do not take place." Either condition points out to the lack of institutional capacity and good governance in urban areas.

showed that “the total net increase of exposure between the 1970s and the 2000s is driven significantly by the increased concentration of the poor (26 percent) in disaster-prone areas, whereas the contribution of that factor remains very small for the non-poor (6 percent)” (Kim 2012, 195).

The author’s quantitative research on 20 countries that explored the relation of urban poverty and income inequality to vulnerability from natural disasters over a 45 year period revealed the following results: Urban poverty gap statistics indicated that in observed years, countries with higher urban poverty gap levels had higher human losses and higher affected population rates than those countries with lower poverty gaps. On the other hand, countries with low urban poverty gap levels had higher monetary damages. Due to lack of data, frequency in urban poverty gap was lower than the national poverty gap research.

Calculations on urban GINI indexes revealed higher human losses in countries with higher urban income inequality, and higher number of affected and monetary damages in locations with lower urban income inequality, and the differences were starker in urban income inequality than that of national income inequality (Gencer 2007, 112). Both statistics as well as other studies reveal the role of income inequality and income poverty in the vulnerability of populations in urban areas, especially in developing countries.

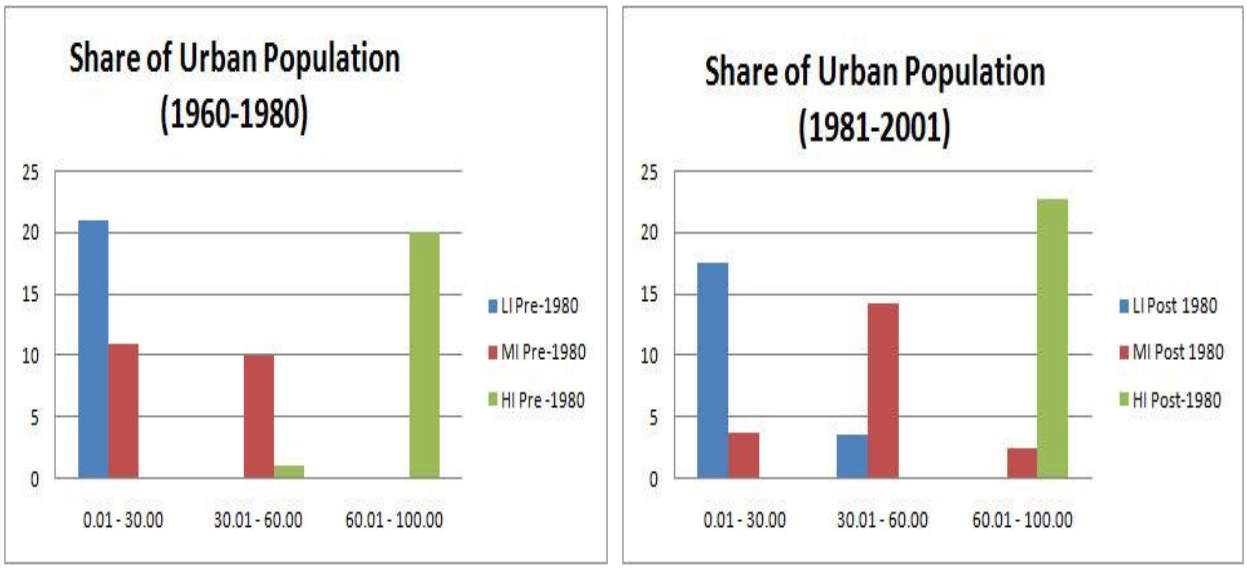
3.3.2 Urbanization and Disaster Risks

High rates of uncontrollable urbanization can increase disaster risks not only with the increase of exposure, but also with the increase in susceptibility due to the lack of quality in housing and infrastructure for the incoming populations.

The author’s quantitative research on urban population growth levels of 20 countries and their vulnerability from natural disasters during 1960-2004 indicated that locations with higher population growth rates significantly experienced higher human losses from disasters. There was dispersion to mid- to higher urban population growth in disasters with higher number of affected populations. Higher monetary damages occurred in countries with lower urban population growth rates, mostly suggestive of high-income European countries in this study (Gencer 2007, 112, 114).

The following two figures exhibit the share of urban population in low-, middle-, and high-income countries before and after 1980. It is observed that before 1980, while the share of urban population was higher in high-income countries, there was a big shift to urban areas in middle-income countries after 1980. The high urbanization rates in developing countries since the 1980s may relate to the and higher human losses and higher affected population from natural disasters in these nations.

Fig. 3.3 and 3.4: Observance of Years with Share of Urban Population: Comparison between the periods 1960-1980 and 1981-2001 in Low- , Middle- and High-Income Countries



Case Study 5: Informal Settlements, Inequality and Earthquake Damage in Istanbul, Turkey[30]

In Istanbul, *gecekondu*[31](squatter) building activity started in the first half of the 20th century due to the housing shortage caused by the loss of old housing stock and the population increase by rural to urban migration,[32]and they first emerged closed to industry or manufacturing sites. The first area that was different from the original small group of shanties and achieved the status of a full gecekondu neighborhood accommodated 3200 gecekondus in 1949 (Tekeli 1994, 94). In the 1950s, gecekondus continued to expand from small concentrations distributed on unsuitable land in the city to large scale neighborhoods located either on urban peripheries or outside of the municipal boundaries (ibid., 151). According to the *Eastern Marmara Regional Plan* studies, gecekondus occupied 9 percent of the land

[30] Excerpts from Gencer, E. 2012. *The Interplay between Urban Development, Vulnerability, and Risk Management: A Case Study of the Istanbul Metropolitan Area*. Springer Briefs in Environment Security and Peace, vol. 7. Heidelberg-Dordrecht-London-New York: Springer-Verlag (in preparation).

[31] *Gecekondu*, a Turkish word born in the 1940s, means, "Built overnight," and describes the illegally constructed squatter buildings. According to its official description in 1966, gecekondus are "dwellings erected, on the land and lots which do not belong to the builder, without the consent of the owner, and without observing the laws and regulations concerning construction and building" (Karpat 1976: 16).

[32] This internal migration after the Second World War was based on the decrease of rural work demand with agricultural mechanization assisted by the postwar US Marshall Plans. Increase of construction work and establishment of new industry in Istanbul were the main pull factors for the newcomers.

within the municipality borders (İB 1966, 21); on the other hand, there was a faster increase in the settlements outside of the municipality borders. From 1950 to 1960, the number of population living in Istanbul's suburbs had multiplied almost by four, and by 1970, by more than fourteen times (Danielson and Keleş 1985, 64).

In the 1980s, there was a change in the form and style of gecekondus as the continuous building amnesties gave way to a rising real estate market in these areas. Gecekondus were no more constructed merely as a shelter for the newcomer, but as a tool to bring rental and sales profits. A strong land mafia emerged with this speculative market, and new peripheral municipalities rose in the outskirts of Istanbul.

According to a study of the Provincial Directorate of Istanbul, in 1992, in the Province of Istanbul, 850,000 buildings had permits, 750,000 buildings were previously regularized by building amnesties, and 400,000 buildings were illegal (Sönmez 1996, 140; Mortan 2000, 49). According to the same study, 17 percent of the gecekondu dwellers had personally established their dwellings in Treasury Land, and 56 percent of the dwellers had purchased them from sellers, who had previously got hold of public land, indicating the rising real estate market in these areas (ibid., 141; ibid).

However, it was not only the gecekondu developments that had started to evolve in the 1980s. As a new professional and economic class emerged with the liberalized economy and a globalized social life, new spatial developments surfaced in the city. Reflecting global influences, these spaces varied from high-rise towers to gated communities, and luxury villa developments. Many of the new residential developments were located in areas not open to development, such as in green areas overlooking the Bosphorus, or in forest areas on the northern part of the city. The new upper class and their exclusive developments, located side by side by gecekondus, brought a new dimension to the social and spatial inequality in Istanbul.

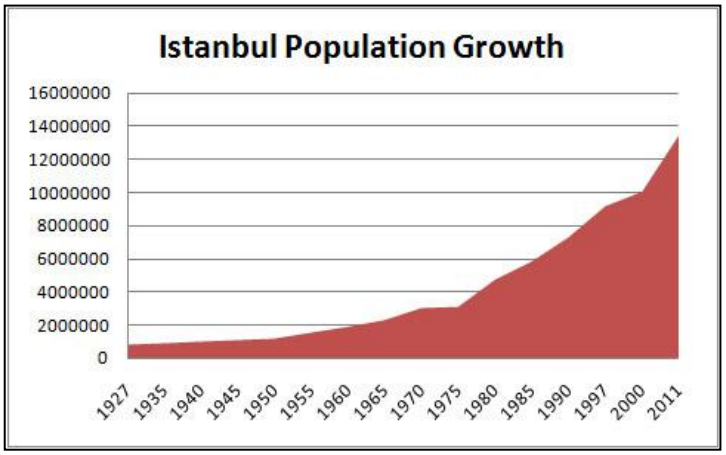
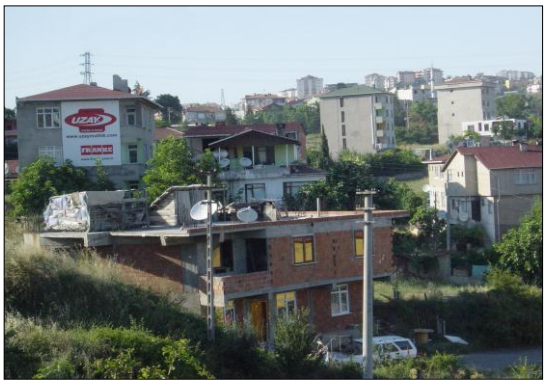


Fig. 3.5 Istanbul Population Growth 1927-2011



Figs. 3.6 and 3.7 A new housing complex in Beykoz, Istanbul and unplastered half-finished buildings with satellite antennas on the roofs, often encountered in the outskirts of Istanbul (Photos by author, 2005 and 2006 respectively).

Indeed, in the 1990s, the rapidly growing migrant population had reached such levels that only 37 percent of the population in Istanbul was born in the city (ibid., 125; ibid., 51)[33]. The new coming populations were either unemployed, or working in temporary or low-skilled jobs. Meanwhile, Istanbul had a significant economic impact in the country, accommodating 40 percent of total industry, as well as 75 percent of the real estate and financial institutions, bringing 42 percent of national tax revenues (Ünsal et al. 2001, 5). However, this generated income has been dispersed in a way that has widened the income gap between Istanbul residents. According to a survey of the State Institute of Statistics in 1994, in Istanbul, the top 20 percent of the population with the highest income levels received 64 percent of the total generated income in the city, whereas the bottom 20 percent received only 4 percent of it (Mortan 2000, 46).[34]

When the August 17, 1999 Marmara Earthquake occurred, the problems of the informally urbanized city and settlements extending to geologically unstable areas revealed themselves with destruction and loss of life. According to the Istanbul Governorate records, despite not being the

[33] According to the 2011 census, the city receives an annual migration of 450 thousand people annually (Turkiye Istatik Kurumu [State Institute of Statistics], 2012, Accessed at: http://tuikapp.tuik.gov.tr/Bolgesel/).

[34] According to the latest available numbers in the Turkish State Institute of Statistics; as of 2001, GDP per capita in Istanbul is $3063. According to 2010 numbers, 18.7 percent of the population in Istanbul has a 60 percent risk of poverty. (Turkiye Istatik Kurumu [State Institute of Statistics], 2012, Accessed at: http://tuikapp.tuik.gov.tr/Bolgesel/).

epicenter of the earthquake, in Istanbul, 981 people lost their lives, 41,180 residences and workplaces were damaged, and 18,162 families needed temporary sheltering (TCİV 2002).

As was described in Section 3.2 of this paper, Marmara earthquakes which affected a highly urbanized area in Turkey caused high monetary damage that was equal to 12 percent of Turkey's GDP at the time. The following figures reveal the high urbanization rates, urban population density, and the sectorial changes in the rapidly developing nation since the 1980s.

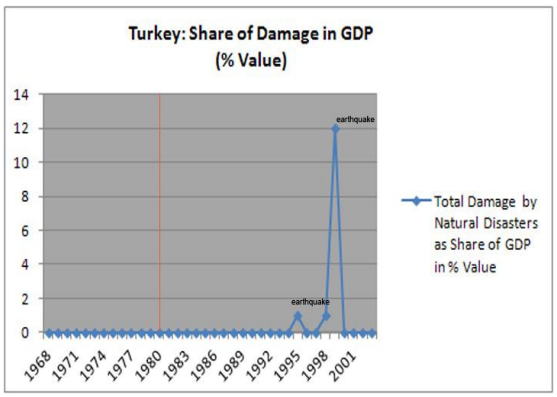


Fig.3.8 Turkey: Share of Damage in GDP

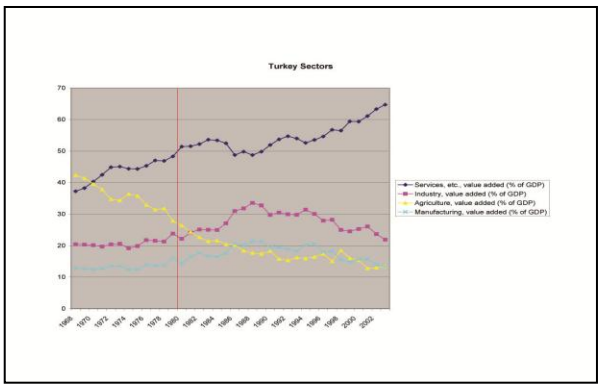


Fig. 3.9 Turkey: Sectors

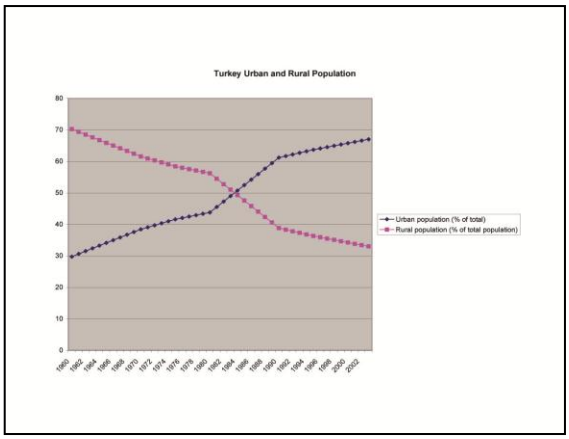


Fig. 3.10 Turkey: Urban and Rural Population

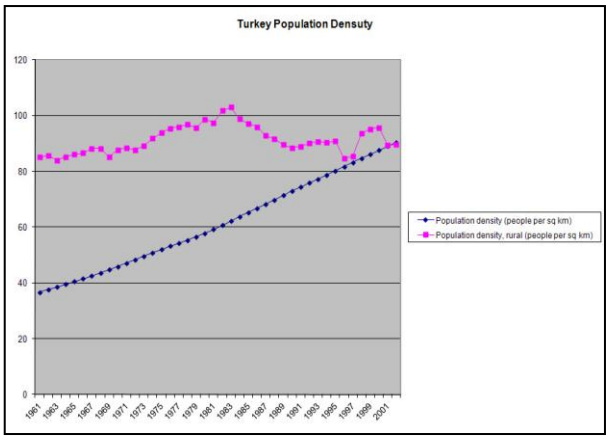


Fig. 3.11 Turkey: Population Density

4. Conclusion

This paper examined some of the socio-economic and spatial changes as a result of the new global economy since the late 1970s, and their potential relation to increased vulnerability and exposure to natural disasters. The focus was on the exploration of: 1) the increased conditions of inter-regional and intra-urban *poverty* and *inequality* and their relation to vulnerability, and 2) increased wealth, assets and concentration of population and thus increase in exposure to natural disasters. This paper examined these relations with a theoretical as well as a quantitative study both in the macro- and the urban- scale.

The theoretical argument in the paper was based on the polarization between certain regions, cities, and groups due to the way they ascribed to the new global economy and employment opportunities since the late 1970s. This polarization reveals itself in different ways societies become vulnerable from or become exposed to natural disasters.

Theoretical arguments as well as the quantitative studies demonstrated that in the macro-scale this polarization and inequality was most apparent in the way low- and high- income countries were affected from natural disasters. Statistics show that low-income countries that could not join the global economy and suffered from increasing poverty had higher mortality as well as higher share of relative damage in their economies. Analysis show that the share of damage from natural disasters in the GDP of low-income countries has increased since the 1980s, taking many times between 10 to 100 percent of the nations' GDP, such as it was experienced in the 2010 Earthquake in Haiti where the damage was equal to 120 percent of the nation's GDP or in Hurricane Mitch in 1998 in Honduras which was equal to 70 percent of Honduras's GDP, perpetuating the "poverty trap" in poor countries. Informational and technological developments with globalization helped improve and create new disaster mitigation and management techniques, but in addition to economic polarization between low and high income countries, statistics show a technological divide as part of the development process as well.

Whereas, high-income economies that gained economic dominance and gained from benefits of the global economy had acquired wealth, assets, and infrastructure that are exposed to rare but catastrophic events in these countries. A comparison between the "triad" – N. America, E. Union, and Asia Pacific – and the rest of the world showed that since the 1980s, while the triad region experienced far less natural disasters (19 percent of the total), they carried 89 percent of the monetary damage from natural disasters. On the other hand, for the high income economies, the share of damage from natural disasters has dominantly been only between 0.01 and 1.00 of their GDP since the 1980s, with the exception for large scale natural disasters such as Hurricane Katrina, which took over 12 percent of the USA's GDP or the 2011 Tohuku earthquake which took about 4 percent of Japan's GDP.

The polarization and inequality also reveal itself between regions and cities in national economies of the developing countries. According to one quantitative analysis highest number of affected population from natural disasters occurred mostly in countries with highest national and urban poverty gap levels, and in another study in middle income developing countries since the 1980s. The shift from agricultural sectors to services and trade caused rapid urbanization levels causing large urban agglomerations and megacities in developing nations. As the left-behind rural population could not join the new economy, national inequality and poverty levels rose. According to a study, in China, the urban-

rural per capita consumption lie between 1.5 and 5 in the 1990s (Lu 2002), and according to a World Bank (2008) report, "urban-rural income rations between 1.5 for developed countries and 3 for developing countries" at the global scale (Hallegatte 2011, 3).

In terms of risk trends, as middle income developing countries such as China and India move from agriculture to service based economies, drought events may have a lesser impact on the economy, while causing a big impact in household level in rural economies, as still a high percentage of population live in rural areas increasing the urban-rural divide. On the other hand, earthquakes are one of the highest damaging natural disasters, especially with respect to when they affect rapidly urbanized areas with higher exposure and vulnerability levels, as was observed in the Marmara Earthquakes in Turkey.

With the new global economy, in addition to the polarization between national and regional economies, inequality and urban poverty grew within the emerging global or globalizing cities, as many newcomers started to work in low-paying services or in informal economy that served the new urban rich classes. In the urban realm, inequality reveals itself in the spatial form, among others, with new types of housing for the rich, such as the gated communities or luxury developments with privatized public spaces, as opposed to peripheral squatter settlements or deteriorated inner-city slums with inadequate public services and amenities. Additionally, deregulation of markets, privatization of public services and inefficiency of governments, especially at the local scale, create inequality as well as increase vulnerability of residents from natural disasters. Local governments which cannot not keep up with rapidly increasing urban population and informal settlements, ease development and building standards and corruption and lack of control add to the increase in urban vulnerability due to substandard housing.

This paper has shown the increasing poverty- encompassing both economic and non-economic factors- and inequality since the 1980s, and the strong tie to vulnerability both in the macro- and the urban- scale. On the other hand, it is necessary to stress that *vulnerability* is not identical to *poverty*; and that "not all poor people are vulnerable to disasters, and some people who are not poor are also vulnerable" (Bankoff 2003, 19). In the new globalizing megacities, exposure due to concentration of population and assets; increased susceptibility, due to substandard infrastructure and housing as well as social and economic composition of residents; and lack of institutional capacity together result in disasters at times of hazard events. Additionally, today as socio-cultural and economic manifestations of globalization is reflected in the urban space, residents have become subject to different forms of inequality and vulnerability. How will the rising inequality between urban residents and market-based decisions of local governments affect disaster vulnerability and risk reduction strategies? Will disaster

risk be a factor in competitiveness between urban regions? Answers to such questions need to be explored for a full comprehension of the socio-spatial changes due to the global economy since the late 1970s and its impacts on disaster risks.

APPENDIX A: A Quantitative Study on Twenty Countries

This research, as part of the author's doctoral dissertation (Gencer 2007), was designed to perform a quantitative study. Data for this research derived from secondary data collection, and was collected through multiple steps.

Selection of countries. Sampling required an independent selection. All countries that ranked under at least two of the following three lists as identified by the United Nations (UN/ISDR 2005) were selected. These lists are:

1. Top twenty-five countries with absolute and/or rela27tive values of people killed
2. Top twenty-five countries with absolute and/or relative values of people affected
3. Top countries with highest economic damages and/or their share of the GDP, as result of natural disasters between the years 1994 and 2004

Thirty countries were identified in this selection. Out of this list, countries, in which more than 10 percent of their population was affected by conflicts between 1980 to 2000[35], or those with no development data (such as Korea DPR) were eliminated. The remaining twenty countries were selected for study.

[35] For this elimination process, data was obtained from *Reducing Disaster Risk* (UNDP 2004).

Table A.1 Selected Countries for Study

Low Income Countries	Lower Middle Income Countries	Upper Middle and High Income Countries
Kenya	Indonesia	Belize
India	China	Spain
Vietnam	Turkey	France
Somalia	Honduras	Japan
Papua New Guinea		USA
Bangladesh		Australia
Mongolia		Italy
Pakistan		
Tanzania		

Country profiles. Basic country profile studies for the selected countries produced an overall view and helped recognize major events that have taken place (such as military interventions or major financial declines).[36] This was useful in understanding outside factors that could affect sustainability and thus attempt to control variables.

Selection of years. Disaster data for selected countries was collected from *EM-DAT, the OFDA/CRED International Disaster Database.*[37] This data includes number of disasters, human loss, and total number of affected and economic loss due to disasters. Due to the large number of disasters[38] that these countries have experienced over the years, a secondary selection of years was established to limit the

[36] Data for country profiles were collected from *World Factbook* (CIA 2005).

[37] OFDA referring to the Office of U.S. Foreign Disaster Assistance is the office within USAID responsible for facilitating and coordinating U.S. Government emergency assistance overseas. Since 1988, the WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED) has been maintaining EM-DAT, an Emergency Events Database, with a partnership of OFDA.

[38] EM-DAT presents disasters that at least fall into one of the following criteria: disasters in which a) greater than or equal to ten people were killed; b) greater than or equal to one hundred people were affected; c) there was a call for international assistance; and d) there was a declaration of state of emergency.

study. This selection was based on the system that the studied years should be a part of at least two of the following three lists[39]:

1. Years in which natural disasters have caused human loss that is either greater than one thousand people, or one out of one hundred thousand of the total population
2. Years in which total number of affected population was either greater than five million people, or 1 percent of the total population
3. Years in which total damage from natural disasters was greater than fifty million dollars[40]

Selection of sustainable development indicators. Indicators of study were selected out of the sixty-two sustainable development indicators as identified by the United Nations (2001). The objective of this selection was to limit indicators to ones that could easily be identified with an aspect of sustainable development.

Table A.2 Selected Indicators for Study

Sectoral Type of Indicators	**Indicators**
Poverty and Social Equity	**Education:** Adult literacy rate **Health:** Percent of population with access to primary health care facilities, Child immunization rates **Income:** Percent of population living below poverty line, Unemployment rate, GINI index of income inequality
Economic Development	GDP per capita, Debt to gross national product ratio, Total official development assistance given or received as a percentage of gross national product, Balance of trade Annual energy consumption per capita

[39] This selection process was designed after a careful examination of data.

[40] Comparison of damages to gross domestic product (GDP) of nations could not be performed, due to lack of availability of currency exchange rates before 1990.

Physical Standards of Living	Floor area per person, Population growth rate, Population of urban formal and informal settlements, Percent of population with access to improved sanitation and water source, Distance traveled per capita by mode of transport, Arable, permanent cropland and forest area
Institutional Capacity	Expenditures on research and development as a percent of GDP, Main telephone lines and number of internet users

Note: Indicators of similar nature and additional indicators of development were used in cases of data unavailability, or in order to enhance research results.

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