AN INDEX OF ECONOMIC SECURITY FOR THREE SOUTH ASIAN AND SEVEN OECD COUNTRIES: METHODOLOGICAL ISSUES

by

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Table of Contents

List of Tables

List of Figures

Abstract

Security about one's economic future is something that is valued by risk-averse individuals and its absence may decrease their economic well-being. Therefore, rich societies have social protection mechanisms in place to guard people against potential economic hazards. However, such mechanisms may be absent in poor countries where people are not only poorer but exposed to significant economic risks. Under this context, this paper inquires if there is a comparable way to measure an Index of Economic Security for a sample of three South Asian and seven OECD countries. We provide a theoretical framework to articulate why economic security is important in the measurement of well-being. We also discuss the human rights perspective on economic insecurity and its implications for measurement of economic security. After constructing a basic index, we conduct sensitivity analysis to determine how much impact methodological choices have on country performance.

List of Abbreviations Used

AA	Arithmetic Averaging
CPRC	Chronic Poverty Research Centre
CSLS	Centre for the Study of Living Standards
ESI	Economic Security Index
EW	Equal Weighting
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GNP	Gross National Product
GPI	Genuine Progress Indicator
HDI	Human Development Index
HDR	Human Development Report
HPI	Human Poverty Index
IEWB	Index of Economic Well-Being
ILO	International Labour Organization
LIMEW	Levy Institute Measure of Economic Well-being
LST	Linear Scaling Technique
OECD	Organization for Economic Co-operation and Development
PA	Power Averaging
PBS	Pakistan Bureau of Statistics
PMRC	Pakistan Medical Research Council
PPP	Purchasing Power Parity
PW	Population Weighting
UN	United Nations
WHO	World Health Organization

Acknowledgements

Chapter 1

Introduction

"True individual freedom cannot exist without economic security and independence. Necessitous men are not free men. People who are hungry and out of a job are the stuff of which dictatorships are made."

These are the words of President Franklin D. Roosevelt[1]who steered United States through the time of Great Depression and World War II. He took office when US was in fourth year of depression. One in four workers was unemployed. The stock market was down 75% from 1929. In just four years, the suicide rate had tripled.[2] These were the times when most Americans were 'economically insecure' and uncertain about what the future holds for them.

But what does Economic (In)Security mean? If a person is jobless does it mean he is also economically insecure? What about a person who has a job? Doesn't he feel insecure in an environment of high unemployment rate? How about a person whose health does not allow him to earn a living? Does he feel insecure? How about a person who is healthy? Is he concerned about falling sick and losing his income? These are all valid questions and the answer to them may not be a simple one.

Osberg (1998) defined 'economic insecurity' as "the anxiety produced by a lack of economic safety – i.e. by an inability to obtain protection against subjectively significant potential economic losses." According to this definition a person feels economically insecure if he/she faces the possibility of future economic hazards. So a

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[1]Franklin D. Roosevelt: "State of the Union Message to Congress," January 11, 1944. Online by Gerhard Peters and John T. Woolley, The American Presidency Project. http://www.presidency.ucsb.edu/ws/?pid=16518.

[2]These statistics are taken from the FDR Presidential Library and Museum Newsletter of Spring 2008:"Action and Action Now" FDR's First 100 Days. Follow the link: http://www.fdrlibrary.marist.edu/museum/pdfs/actionguide.pdf

person who has a job may feel insecure that in future he might lose it. A person who is healthy may feel insecure that he might fall sick. A person who is young may feel insecure that in future he might face poverty in old age. Thus it is the anxiety about possible future losses that causes individuals to feel insecure.[3]

Such anxieties are faced by people in all countries irrespective of whether they live in an affluent country or a poor one. However the magnitude and implications of those anxieties may differ across nations. Fears about future economic outcomes decrease individuals' enjoyment of the present and influence their behaviour. To avoid such risks people buy insurance (public or private), make less risky decisions or build formal or informal networks of social support. Risk mitigation mechanisms are found in rich countries (for example the social security system, retirement plans, child care benefits etc.); however, they may not provide complete protection to avoid the problem of moral hazard. On the other hand in poor countries public insurance might be completely absent and people might not have any protection, whatsoever, against risk of future economic hazards.[4] Whatever the case may be, the important point is that the anxiety produced by this uncertainty about future is the central theme of economic insecurity in a society. Note that the financial circumstances that produced these anxieties might be quite different between rich and poor countries; the important point is, people are insecure if they feel anxious about their economic future, no matter what circumstances motivate that anxiousness.

There is, thus, a need to have a yardstick measure that can somehow account for these uninsured economic risks in order to influence public policy decisions. Such a measure should directly establish a link between specific economic hazards and the requisite policy tools that can help mitigate the effects of loss for citizens. However constructing this 'Index of Economic Security' involves decisions to be made about methodological issues. Sharpe & Salzman (2003) highlighted the importance of such

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[3]People feel anxious (or insecure) due to many reasons. It may be psychological where a person feels anxious because he/she is nervous of being in a social situation. Feeling of insecurity may also be triggered by death of a loved one, past emotional scars, family problems, life failure etc. These are all examples of people feeling insecure but the reason is 'non-economic'. However, in this paper we are only concerned about insecurities due to possibility of adverse 'economic' events in the future.

[4]We argue, later in the paper, that informal networks might be present in poor countries to substitute public insurance but they might not be perfect.

methodological issues and its implications for the underlying properties of the index. They analyzed the main decisions made by popular indices of well-being and developed a sequential typology of methodological choices involved in index construction namely: choosing a single or complementary approach to the index, selecting variables, determining the functional form of each variable, choosing a method of standardization, choosing an aggregation operation, and determining a weighting scheme.

This paper aims to construct an Index of Economic Security for three South Asian countries (Bangladesh, India and Pakistan) and seven OECD countries (Canada, France, Germany, Norway, Sweden, UK and the US) following an approach similar to the one introduced by Osberg (1998).[5] We will then analyze how the results of our index might change as a result of changing some of the methodological decisions as suggested by Sharpe & Salzman (2003). Specifically I will first calculate the Index of Economic Security similar to Osberg & Sharpe(2011) and afterwards I will change two important aspects of Index construction i.e. standardization method and aggregation operation.

The rest of this paper is structured as follows: In Chapter 2, we begin by asking the question 'what Economic Security really means'. We will then review how the topic is covered in literature and in what different contexts have researchers studied this concept. In Chapter 3, following a strand of research introduced by Osberg & Sharpe (2002), we will highlight the importance of Economic Security in the context of Economic Well-being Literature. Chapter 4 of this paper will provide a conceptual discussion of why 'Economic Security' is important for individuals in a society and how might it affect their well-being. We will also discuss the difference between human rights perspective and social welfare function perspective on how to objectively measure economic security. In Chapter 5, we will follow a 'named risk' approach to develop the Index of Economic Security for ten countries in our sample. In this chapter, we will also review how different methodological choices regarding index construction might affect our results. Chapter 6 concludes.

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[5]Later on Osberg & Sharpe(2002, 2005, 2009, 2011) studied economic insecurity in the context of economic well-being to construct an overall Index of Economic Well-Being(IEWB).

Chapter 2

What is Economic Security? Literature Review

In economic literature the concept of 'uncertainty about future events' is studied in two different strands of literature – the 'vulnerability' perspective and the 'economic insecurity' perspective both of which study exposure of households to adverse economic outcomes. However, the context in which these two literatures have developed is quite different. Researchers have discussed the concept of 'Vulnerability' in the context of very poor countries. The vulnerability literature is concerned with the likelihood that people in poor countries will enter into poverty or chronic poverty. Specifically the focus of vulnerability literature is on the 'transient poor'. The Chronic Poverty Research Centre (CPRC) categorizes poverty into five tiers (see Hulme et al. 2001, figure 3), in which the 'transient poor' are defined as both the 'churning poor', people who fluctuate above and beneath the poverty line and the 'occasionally poor', people who occasionally dip into poverty due to extreme decline in income. In this context, therefore, 'vulnerability' is concerned with the 'transient poor' and does not focus on those who are already in poverty – the chronically poor (Prowse, 2003). Dercon (2005) has similar viewpoint about vulnerability as "the existence and the extent of a threat of poverty and destitution; the danger that a socially unacceptable level of well-being may materialise."

However 'Economic Insecurity' has been studied in the context of rich countries where incomes are relatively high and 'absolute' poverty is not really a big concern (at least not for a big part of population). The focus of policy analysis is on building appropriate social protection mechanisms so that people are protected against future hazards. Economic security perspective is more concerned about all individual's anxieties about their economic future. Osberg (1998) defined 'economic insecurity' as "the anxiety produced by the lack of economic safety – i.e. by an inability to obtain protection against subjectively significant potential economic losses"(1998: 17). The

United Nations Department of Economic and Social Affairs (2008) has used the definition "economic insecurity arises from the exposure of individuals, communities and countries to adverse events, and from their inability to cope with and recover from the costly consequences of those events."

If we examine closely the definitions of the two interrelated concepts, we would find that the focus of 'Vulnerability' is only limited to those individuals who are at risk of poverty or destitution whereas 'Economic Security' perspective is concerned about the anxieties experienced by all the citizens – it considers that even though 'economically better-off' people may not be at immediate risk of falling into poverty, they may still feel anxious about their economic future. This paper will focus on the 'Economic Security' perspective.

The topic of Economic Security is usually covered in the context of how it affects the overall economic well-being of individuals in a society. In a series of papers Osberg & Sharpe (2002, 2005, 2009, 2011) developed an index called the Index of Economic Well-being (IEWB) to measure the 'economic' aspects of individuals' well-being in a society on a national level. Economic Security is measured as part of the over Index.

Wolff & Zacharias (2003) also constructed a similar measure called the Levy Institute Measure of Economic Well-being(LIMEW) for United States. They, however, do not compute Economic Security directly as part of the overall Index; instead they implicitly assume that the 'income and wealth' subcomponent of LIMEW accounts for the 'economic insecurity' component of well-being.[1]

Jacob Hacker and his Yale colleagues (2010) developed 'Economic Security Index' (ESI) for United States which depends on three explicit risks 'experienced' by Americans in their day-to-day lives – major loss in income, large medical expenditures, lacking financial wealth to buffer the first two risks. They argued that the ESI

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[1]Stiglitz, Sen & Fitoussi (2009) as part of the 'International Commission on the Measurement of Economic Performance and Social Progress' presented a report in which they take a broader perspective and talk about how to measure 'Quality of Life' in a society. They present an overview of how an alternative measure may be developed to measure societal welfare, what other metrics already exist, and how improvement in internationally comparable statistics may boost the development of such metrics. They recognized that 'Economic Security' is an important part of the overall well-being in a society.

focuses on the risks actually 'experienced' by an average American and it does not depends on variables of 'subjective' nature. They however note that "for each American who actually experiences economic insecurity as measured by the ESI, others may be made anxious by learning about that experience." However they emphasize that the purpose of their Index is to focus on those variables that are most readily and consistently measureable about the economic dimensions of insecurity.

Whatever the context may be, researchers are now exploring the question of what constitutes economic security and how it affects the economic decisions made by people. The purpose of this paper is similar and follows the methodology developed by Osberg & Sharpe (2002). The Centre for the Study of Living Standards (CSLS) publishes the Index of Economic Well-Being (IEWB) for mostly the OECD countries but efforts to calculating similar index for other less developed countries is limited mainly due to data availability. As mentioned earlier the 'Index of Economic Security' is calculated as part of the overall IEWB measure. The aim of this paper is to develop a comparable measure of Index of Economic Security for three South Asian (Bangladesh, India and Pakistan) and seven OECD countries (Canada, France, Germany, Norway, Sweden, United Kingdom, and the United States).

Chapter 3

The Index of Economic Well-Being: Background

Well-being is an abstract concept that encompasses not only the physical or economic state of an individual but also involves his mental, psychological and spiritual conditions. It is a term that is used by Psychologists, Economists and Doctors to describe different aspects of an individual's welfare. For example a Psychologist may be concerned about how people experience the quality of their lives and focus on the emotional and cognitive elements of human overall well-being. A doctor may regard well-being as good health of a patient. An Economist may be more focused on studying the material or economic determinants of well-being. It is not to say that the three perspectives on well-being have evolved independently of each other but there exist important links that cannot be ignored.

In this paper we will focus our attention on the 'economic' aspects of well-being i.e. an individual's "access to economic resources" or his Economic Well-being. For most part of our recent history, especially after World War II, countries have considered growth in their domestic or national product to be equivalent to increases in economic well-being. Specifically growth in simple accounting measures like per capita Gross Domestic Product (GDP per capita henceforth) has been the target of policy initiatives by governments all around the world and success in achieving high growth have been applauded by economic pundits as representing improvements in economic welfare of the country.

Economic well-being, however, is a broader concept. Although it is restricted to material aspects of well-being, but it also involves goods that are produced by non-market activity for example leisure, wealth, longevity to name a few. As well, unemployment and insecurity about future economic outcomes subtracts from economic well-being which are not accounted for in a simple measure such as per capita GDP.

Robert F. Kennedy, in a 1968 speech, said:[1]

"Too much and for too long, we seem to have surrendered personal excellence and community value in the mere accumulation of material things. Our Gross National Product counts air pollution and cigarette advertising and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for the people who break them. It counts the destruction of the redwoods and the loss of our natural wonder in chaotic sprawl. It counts napalm and it counts nuclear warheads, and armoured cars for the police to fight riots in our cities.
Yet the Gross National Product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country; it measures everything, in short, except that which makes life worthwhile."

R.F. Kennedy correctly notes that a simple accounting measure of production like GDP or GNP cannot assess quality of life and that 'other things' are equally important that "makes life worthwhile." Is increasing GDP equivalent to increasing well-being? Is it worthwhile to consider the related social costs (pollution, inequality etc) that accrue to society when pursuing growth? Does increase in production and consumption always increase utility? The answer is that 'it depends'. GDP per capita provides a partial measure of consumption and wealth accumulation (which are important determinanats of societal welfare) but other aspects valued by society are ignored and therefore we have to be cautious about using GDP per capita as a benchmark for wellbeing.

Furthermore, GDP per capita does not account for how the wealth in a society is distributed among people. Increases in GDP per capita do not accrue equally to all members of society. It may happen that only a small portion of individuals enjoys the benefits of GDP increase at the expense of others.[2] Therefore to better capture the

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[1]Robert F. Kennedy Address, University of Kansas, Lawrence, Kansas, March 18, 1968. Follow the link: http://www.jfklibrary.org/Research/Research-Aids/Ready-Reference/RFK-Speeches/Remarks-of-Robert-F-Kennedy-at-the-University-of-Kansas-March-18-1968.aspx

[2]For example, for United States Saez (2013) estimated the average real income growth for the recovery

notion of "command over resources", it is important to measure other dimensions of economic well-being such as wealth accumulation, economic inequality and economic insecurity.

Several international organizations, commissions and independent researchers have proposed alternative measures to capture the economic well-being in a society. In 1980s the Genuine Progress Indicator (GPI) was introduced by Herman Daly and John Cobb which starts with GDP but then adjusts it for income distribution, household and volunteer work and subtracts factors such as the cost of crime and environmental pollution.

The Human Development perspective to well-being that was devised roughly in the beginning of 1990s, changed the course of development policy debate from one that focuses on the rise and fall of national incomes to one that focus on enlarging human freedoms. It argues that the process of development should "expand human capabilities by expanding the choices that people have (in order) to live full and creative lives" (HDR, 2004, p. 127). It further argues that to identify the most important capabilities, two important criteria must be met; these capabilities must be universally valued and they must be basic to life i.e. their absence preclude many other choices. Thus to ensure a good 'quality of life', the human development perspective proposes that four important capabilities must be met: to lead a long and healthy life, to be knowledgeable, to have access to the resources needed for a decent standard of living and to participate in the life of community. For this purpose the Human Development Reports publish several indicators to evaluate progress in these four dimensions. One such index is the Human Development Index (HDI) that focuses on the first three dimensions. To account for longevity it uses life expectancy at birth, for knowledge adult literacy rate and the combined primary, secondary and tertiary gross school enrolment rates (with differing weights) are used, and finally to account for means to achieve the first two capabilities (or "command over resources"), it uses linearly scaled log of GDP per capita. Hence the HDI indicator recognizes that 'quality of life' is not just about having more wealth, it is also about having the physical capability and intellectual consciousness to understand and enjoy the

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period from 2009–2011 to be 1.7%. However the top 1% on the income spectrum observed their real incomes growth at a rate of 11.2% while the bottom 99% saw their real incomes decline by 0.4%.

world around us. Hence HDI augments the basic measure of GDP per capita by two very important but ignored components of human development. Unlike GDP per capita, these two dimensions of longevity and knowledge are not about consumption of commodity but about what (in the words of R.F. Kennedy) "makes life worthwhile".

Some might argue that both these dimensions, longevity and knowledge, are accounted for in GDP measures since GDP already includes expenditures on schooling and health care and it also includes resulting increments in money income produced by education and good health. However, thinking of longevity and knowledge in expenditure terms captures only one part of their benefits to society. Even though health and knowledge does produce 'human capital' and boost incomes, they both have much broader role to play in the quality of individuals' lives. The Human Development perspective recognises that health and knowledge are also valuable in themselves because they increase the human capability to lead a long life of understanding and meaning, therefore greater knowledge and better health are crucial aspects of good life.

Osberg & Sharpe (2005) argued that using GDP per capita to account for "command over resources" in HDI is potentially misleading and that a better measure is needed to form a superior index of human development. They further argued such a measure should take into account not only the average consumption flows and capital accumulation (both of which are well accounted for in GDP per capita), but also an estimate of income distribution and economic insecurity.

The Centre for the Study of Living Standards (CSLS) publishes the Index of Economic Well Being (IEWB)[3] for mostly the OECD group of countries that tracks the economic component of societal well-being. In a series of papers Osberg & Sharpe (1998, 2002, 2005, 2009, and 2011) have described the four components of IEWB and demonstrated for OECD countries how these four components are combined into one index. The four components are effective per capita consumption flows, net national accumulation of productive resources, income distribution and economic security.[4]

The first three components have been extensively discussed in literature (whether

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[3]Other similar alternative indices have been established by researchers to proxy economic well-being but only three of them (HDI, GPI and IEWB) are discussed here.

[4]Osberg (1985) provides a theoretical framework that became the basis of developing the Index of Economic Well-Being

in the context of measuring economic well-being or examining each component independently) but research on economic security is limited mainly due to lack of data availability. Osberg (2010) has illustrated how a comparable Index of Economic Security may be constructed for a less developed country like Tanzania using micro-level household data obtained from 2007 Tanzania Household Budget Survey along with other international databases.[5] The chapter that follows discusses the theoretical framework developed by Osberg (1985, 1998) underlying the Index of Economic Security.

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[5]Following a similar approach Osberg & Sharpe (2011) calculated comparable measure of Economic Security for four other less developed economies (Brazil, Mexico, South Africa and Vietnam).

Chapter 4

Economic (In)Security: Theoretical Framework

An important assumption in modern economic theory is that economic agents are risk-averse and that they have diminishing marginal utility of consumption. This implies they prefer to have relatively stable pattern of consumption over their lifetime. Since income flows can be variable from one year to the next and capital markets are usually imperfect, consumption is often constrained by income which means individuals consume different amounts in different years of their lives depending on their income outcomes. Thus, the marginal utility of an additional dollar worth of consumption might differ from one year to another and therefore it is not straightforward to add up utility of consumption in different years to come up with a measure of lifetime welfare for an individual.

Income flows depend on the conditions in labour market – the possibility of getting unemployed, the rates of job promotions, the likelihood of finding overtime work etc. – and these conditions are often highly uncertain. This represents a mismatch between what risk-averse individuals prefer (stable consumption) versus what they actually experience (uncertain consumption) due to variability in incomes. This uncertainty causes a loss in expected utility for risk-averse individuals since they would prefer to accept a lower certain consumption flow versus higher but uncertain consumption.[1] This loss in expected utility suggests that certainty of income flows or in other words 'economic security' is something that individuals typically value. Therefore estimates of economic welfare such as the present value of consumption should be adjusted to reflect the insecurity that is inherent in variable income flows.[2]

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[1] For more detail on the loss in expected utility due to uncertainty see Appendix Two of Osberg (1998)

[2] Note that insecurity is not only limited to the loss in expected utility rather it entails psychological distress and other social costs that individuals experience due to uncertainty in outcomes for example expectations of getting laid off does not only have financial consequences but it might also entail feelings of depression and anxiety.

However, in the presence of perfect capital and insurance markets, variability in income would not be a problem. People could predict with certainty their future incomes which would help them to spread their consumption evenly over the years – they would borrow in years of low income and repay loans or save in year of high income. The consumption plans of individuals would then be independent of their income flows and lifetime welfare of individuals may be calculated by simply adding up the discounted values of utilities from consumption over time. Thus people would not be worried about their future economic outcomes as they already perfectly know it and can take measures now to guard themselves against them. Hence income variability and uncertainty or in other words 'economic insecurity' does not accrue added costs to individuals and hence it should not be accounted for in welfare (or well-being) measures.

But the assumptions of perfect capital and insurance markets are acute and unrealistic. It, incorrectly, assumes that lending and borrowing rates are equal which implies that it is not possible for people with variable incomes to finance the same consumption as people with stable incomes. Perfect capital markets also assume that inflation is fully anticipated and reflected in nominal interest rate, there are no bad debts, borrowers of high credit worthiness get the same treatment (pays equal interest rate) as less credible borrowers, and that collateral is not important in lending decisions. These are all very severe assumptions which are not observed in real capital markets. A person with good credit history, expectation of future labour income and substantial assets is likely to be treated favourably as compared to a person who lacks these things. This means that private capital markets will be imperfect for the poor, the old, the sick and the frequently unemployed. Insurance market might not be a feasible alternative since problem of moral hazard reduces its effectiveness for its users.

The problem of imperfect capital and insurance market is somewhat mitigated by the presence of public social insurance programs. These programs allow people to pay contributions and taxes when they are young healthy and employed and draw benefits when they get old, sick or unemployed to help them smooth their consumption over lifetime. However to preserve the incentive and avoid moral hazard, these social insurance programs are structured in a manner that they allow only partial smoothing

out of consumption and people are still faced with the risk of losing some part of their incomes in some unforeseen adverse economic outcome.

Because private capital and insurance markets are imperfect and public social insurance programs are incomplete, people remain exposed to some uninsured risks about future economic hazards. Since individuals are assumed to be risk-averse, they incur a loss in expected utility when faced with uncertain outcomes. This entails a costs to individuals or we can say that uncertainty about future economic hazards (variable income flows versus stable consumption needs) or 'economic insecurity' subtracts from lifetime utility (or economic well-being) of individuals. The section below covers two important perspectives about what constitute economic insecurity and how should it be measured.

4.1 The Human Rights and Social Welfare Function Perspectives[3]

What does it mean for society as a whole if people are insecure about their economic future? Does it affect the Social Welfare of society? How does measuring Economic (In)Security or Vulnerability or lack of Social Protection[4] help in devising public policy to enhance Social Welfare? What economic hazards should be included when calculating such an index? Which ones should be excluded? What follows are the two perspectives on economic insecurity that highlight its different dimensions.

One of the goals of public policy is to maximize 'Social Welfare' of society. In classical economics, the Social Welfare Function is defined as the weighted sum of individual utilities in which the weights may be proportionate to an individual's position in income distribution – i.e. a poor person's utility may be given more weight compared to a person who is rich. Social Welfare Function defined in this way accounts for the inequality in distribution of utilities among individuals.[5] It also assumes that

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[3]This section hugely draws from Osberg (1998)

[4]In rich countries the terms 'economic insecurity', 'social protection' and 'social security' are used in literature to refer to same underlying issue of anxieties about future economic outcomes while in poor countries such issues are highlighted under the concept of 'Vulnerability'. As discussed before, there is a subtle difference between 'Vulnerability' and 'Economic Security' perspective, but we tend to ignore it here. We will only focus on the economic security perspective.

[5]Social Welfare according to the original Utilitarian Principle developed in the nineteenth century

individuals have diminishing marginal utility of consumption and therefore they are risk averse. They will take steps to avoid any risks or uncertainties in the future. Risk-averse individuals will be worse off if they face any uninsured risk, but providing them complete insurance protection will lead to moral hazard problem, therefore neither complete coverage nor complete protection is optimal. For public policy to be effective, we must decide how much of the risk must optimally remain uninsured in order to retain the incentive but minimize (to the extent possible) the anxieties for individuals in the society. This requires measurement of anxiety (risk) due to future economic hazards (economic insecurity) on a national level. Therefore constructing an Index of Economic (In)Security serves as an transitional step to developing a public policy to maximize Social Welfare.

The Human Rights perspective contends that in order for individuals to exercise free will in their political and economic choices, they must be in possession of their basic human rights. Franklin D. Roosevelt quite ingeniously puts this principle into a concrete sentence: "Necessitous men are not free men."[6] If the purpose of public policy is to maximize the weighted sum of utilities, it must first achieve 'equal basic liberties for all.'[7] Therefore fulfilling the basic human rights of individuals in society is the primary objective of a government. Only after providing the basic human rights, thus empowering individuals to follow their own opinion of good life, maximization of the social welfare can be obtained as a secondary objective of public policy.

The natural question now is what are those basic human rights that a public policy should promote? How to formulate them? Will it be acceptable to everyone? Osberg(2010) hypothesized that "the credibility of distinctions between what is, and

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gives equal weight to all individual utilities with a linear social welfare function which means that inequality of incomes and wealth is not accounted for in the Social Welfare function. According to the 'Justice as Fairness' principle of John Rawls (1971) economic progress should be assessed in terms of its impact on the least well-off members of society – which implies giving maximal weight on the lowest utility in the Social Welfare function. For more discussion on this topic see Osberg (1985, pg 57 – 61)

[6]Roosevelt's State of Union Address to Congress of the United States on January 11, 1944

[7]This in in line with Rawls criterion of Social Justice which requires the fulfillment of the first principle i.e. "equal basic liberties for all" before the attainment of the second principle of maximizing the "benefits of the least advantaged members of society." See Rawls (1982, pg. 161)

what is not, considered to be a human right depends heavily on the legitimacy of the process by which rights are articulated." It is to say that a single person or a small group of people cannot proclaim certain rights to be universal; rather such a claim must be established through legitimate democratic process. United Nations may represent the best example of such democratic institution that can claim universal legitimacy and therefore formulation of the basic human rights must come in the domain of United Nations.

Article 25 of the United Nations' Universal Declaration of Human Rights stated in 1948:

"Everyone has a right to a standard of living adequate for the health and well-being for himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control."

According to this perspective, the main goal of public policy is to ensure that certain primary goods (i.e. food, clothing, housing and medical care) and specific safety nets (i.e. security in the event of unemployment, sickness, disability, widowhood, and old age) should be available to all individuals. This is in contrast to what the social welfare function perspective proposes i.e. to maximize the aggregate individual consumption and utility. Unlike the human rights approach, the social welfare perspective does not highlight the specific dimensions of security that is the right of all individuals in society.

Following the human rights approach, the measure of economic insecurity should highlight the extent to which these basic rights (as specified by Article 25 of the UN Universal Declaration) are fulfilled in a society. Osberg (1998) adopted a 'named risk' approach to construction of the Index of Economic Security which comprises of five components corresponding specifically to the risks mentioned in Article 25 of UN Human Rights Declaration (i.e. security from unemployment, sickness, disability, widowhood and old age).

Chapter 5

The Index of Economic Security for three South Asian and seven OECD countries

The 'named risk' approach of Osberg (1998) propose that there are five key economic risks that must be accounted for in the measure of Economic Security Index – unemployment, sickness, disability, widowhood and old age. Later on in a series of papers Osberg & Sharpe (2002, 2005, 2009, 2011) assumed that changes in the subjective level of anxiety about a lack of economic safety are proportionate to changes in objective risk. Therefore in order to measure those anxieties produced by uninsured economic risks, we have to specify the objective empirical risks that provoke those anxieties. Article 25 of the UN Declaration helps us in identifying those objective risks: unemployment, sickness, disability, widowhood and old age.

5.1 Security in the Event of Unemployment

The risk of unemployment depends on three variables: the unemployment rate, proportion of unemployed receiving unemployment benefits, and the replacement rate of these benefits.[1] However due to unavailability of comparable data on the second variable (proportion of unemployed receiving benefits) it is dropped from the calculation of security from unemployment. The remaining two variables will be the basis of our sub-index of Security from Unemployment.

But how should these two 'empirically' available variables be used to estimate the risk of unemployment to people? First of all, the rate of unemployment directly affects the risk that currently employed people face. If the unemployment rate is low then people have few reasons to believe that they are in line of getting unemployed.

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[1] Replacement rate here refers to the average proportions of lost earnings that are replaced by unemployment benefits.

However if unemployment is high (for example 7.6% in June 2013 in United States)[2] and people see their coworkers, neighbours, friends or relatives getting laid off, they start to expect the same would happen to them. Hence the more the unemployment rate, the more anxious people feel of getting unemployed and not having a job in the future. However if unemployment benefits are in place to secure those who lose job, then this anxiety or insecurity is somewhat mitigated. Therefore the two measures i.e. the unemployment rate and replacement rate affect the level of insecurity that people feel in the event of unemployment. But how might these two measures be combined into a single index of Security from Unemployment? Sharpe & Salzman (2003) noted that this involves three important decisions: Is there a need to standardize the variables first before combining them? After standardization, what type of aggregation operation should be used? And lastly what is the weight given to each component in the index?

Osberg & Sharpe (2011) preferred to use Linear Scaling Technique (LST) to standardize variables to a common scale. Using this method, each observation of the variable is expressed as a proportion of the observed range of values.[3] According to Sharpe & Salzman(2003), there is another method of standardization called the 'Z-score Normalization' or 'Gaussian Normalization.' It involves calculating the Z-score for each observation of variable and then ranking the observations accordingly. The Z-score of a variable represents the number of standard deviations it is away from its mean, and therefore does not standardize variable to a common range. In this section, we will use LST for standardization and in a later section we will use Z-score normalization and examine the difference in results.

After standardizing variable, the next step is to aggregate them into a single index. Two aggregation operations are relevant in this situation. One is multiplicative aggregation in which the probability of financial loss (or the risk from unemployment) can

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[2]Source: Bureau of Labour Statistics, USA. Link: http://www.bls.gov/cps/

[3]Assume that r_{max} is the highest risk jurisdiction and r_{min} is the lowest, a specific observation r_i can be standardized using Linear Scaling formula $I_i = (1.1^* r_{max} - r_i)/[1.1^*(r_{max} - r_{min})]$, where I_i is the scaled value of observation r_i . This method gives the location of a specific observation compared to the observed range. In the formula, 10% is added to allow standardization of observations at extremes of the observed range.

be modeled as (probability of not having job) * (fraction of wage not replaced by unemployment insurance). This method takes account of the interdependence between the marginal impacts of changing unemployment rate or replacement rate. However, as noted by Osberg & Sharpe (2011), this approach gives equal importance (weight) to both variables and ignores any non-economic costs of unemployment. But unemployment itself can sometimes cause more psychological and emotional stress than what the unemployment benefits might compensate.[4] Therefore if we want to put higher weight on the negative effects of unemployment and less weight on the mitigating positive effects of unemployment benefit, we cannot do so using multiplicative aggregation. Furthermore there are some methodological problems with multiplying variables that are already scaled using LST (For example the overall risk will not be scaled to the same range as the original variables (Sharpe & Salzman, 2003:14).

On the other hand, arithmetic averaging or additive aggregation solves the problems encountered by multiplicative aggregation. It gives explicit weight to each variable and sums the product of each variable and its weight. If unemployment rate matters more to well-being of individuals as compared to unemployment benefits, then more weight can be given to unemployment rate when performing aggregation. Also arithmetic averaging does not affect the range of combined risk even if variables are already scaled using LST. However this method implicitly assumes that there is no interdependence between the two variables.

For purposes of calculating Index of Security from Unemployment,[5] we will use LST for standardization and arithmetic averaging for aggregation. Explicit weights of 0.8 will be given to unemployment rate and 0.2 to replacement rate.[6] The Index

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[4]Di Tella, MacCulloch & Oswald (2003) noted that the negative impact of unemployment is much stronger than the mitigating effect of unemployment benefits. Further Ruhm(1991) and Chan & Stevens(1999) found negative long run impact of job loss on the wages of displaced workers.

[5]Note that we are calculating an Index of Security and not Index of Insecurity from Unemployment. This means that if an increase in any variable corresponds to increase in overall welfare then it is scaled in such a manner that it increases the Index of Security from Unemployment. Similarly if increase in a variable (e.g. unemployment rate) corresponds to a decrease in overall welfare then it is scaled accordingly such that it results in a decrease in Index of Security from Unemployment.

[6]Osberg & Sharpe(2011) adopted a similar methodology.

is calculated according to the following formula:

$$\text{Index of Security from Unemployment} = \text{W * Scaled unemployment rate}$$
$$+ (1 - W) * \text{Scaled benefit replacement rate} \quad (5.1)$$

The above methodology to estimate the risk from unemployment works for rich countries as majority of their population work in the formal labour market where they derive incomes to enable household consumption. In the event of unemployment they rely on unemployment benefits and other social programs to smooth out variations in consumption. The informal (unrecorded) economy barely exists and the agricultural sector is relatively small. So for majority of people living in rich countries, the risk of losing labour market income (unemployment) is equivalent to loss of livelihood.[7]

However in poor countries, most of the people are dependent either on agricultural sector or an informal economy of trading and self-employment for subsistence.[8] Incomes in the agricultural sector are subject to high variability[9] and therefore people working in agriculture face the added risk of loss of livelihood compared to people working in the formal labour market. Thus the unemployment rates in the labour market are not representative of the risks of loss of livelihood faced by majority of people in poor countries. Therefore the Index of Security from Unemployment should be adjusted to reflect this phenomenon. A better measure would be a population weighted average of the risks of loss of livelihood associated with agricultural and non-agricultural employment. Rather than calling it Security from Unemployment, Osberg and Sharpe (2011) preferred to call it "index of Livelihood Security".

$$\text{Index of Livelihood Security} = P_U * I_U + P_A * I_A \quad (5.2)$$

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[7]Note that the implicit purpose of including "Security from Unemployment" in Article 25 of the UN's Universal Declaration of Human Rights is to ensure that people are protected against any risk of loss of livelihood. In rich countries involuntary unemployment is synonymous to loss of livelihood.

[8]For example according to Labour Force Survey 2012–13, nearly 45% of the employed population worked in agriculture, hunting and forestry. For Bangladesh it was 47.5% (2010 Labour Force Survey) and for India it was above 51% (ILO database).

[9]Productivity in agriculture is highly dependent on weather conditions especially in poor countries due to lack of state-of-the-art technology, inadequate irrigation facilities, and weak infrastructure.

where P_U = Percentage of employed people in non-agricultural sector

I_U = Index of Security from Unemployment

P_A = Percentage of employed people in agricultural sector

I_A = Index of Agricultural Livelihood Security

Table 5.1 demonstrate the how Index of Livelihood Security is calculated for our sample group consisting of seven OECD and three South Asian countries. Column A and C report the unemployment and benefit replacement rate for 2011[10] to calculate the Index of Security from Unemployment.[11] Column B and D uses Linear Scaling to calculate scaled unemployment and benefits replacement rate while column E aggregates the two scaled values into the Index of Security from Unemployment using the weights as described earlier (0.8 for unemployment rate and 0.2 for replacement rate).

The variability in production of agricultural output affects those employed in this sector. The variability may be caused due to several reasons – drought, floods, pesticides, natural calamities etc. A good measure of risk of loss of livelihood in agriculture should account for this variability. Column G reports the percentage deviation from ten year trend of the gross per capita Food Production Index in 2011 which can be used as a good approximation of the risk of livelihood in agriculture sector.[12] Column H scales the values using linear scaling and column F gives the percentage of people employed by the agriculture sector. Column I calculates the population weighted average of columns E and H and column J gives country wise ranking in terms of their performance according to the final Index of Livelihood

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[10] For countries where 2011 unemployment rate is unavailable, we have used the most recent unemployment rate.

[11] The estimates of Gross Replacement Rate for two earnings levels, three family situations and three durations of unemployment are taken from OECD Tax-Benefit Models. See OECD (1994), The OECD Jobs Study (chapter 8) and Martin J. (1996), "Measures of Replacement Rates for the Purpose of International Comparisons: A Note" for more explanations. Note it is assumed that replacement rates are zero for poor countries.

[12] Note that variance is a measure that is affected by both positive and negative deviations; however agriculture livelihood security is about the downside deviations of crop outcomes. Appendix B of Osberg & Sharpe (2011) discussed the possibility of calculating the risk of agricultural livelihood loss from satellite measurements.

Security.

As noted earlier, the percentage of employed population in the agriculture sector for OECD countries is in the range of 1–3 percent while for all the three South Asian countries it is nearly half of their employed population. This suggests that agriculture production variability might not be a concern for rich nations but it overwhelmingly affects the livelihood outcomes for people in poor nations and therefore an Index of Livelihood Security should account for this uncertainty.

It is interesting to note from Table 5.1 that four out of six OECD countries (France, Canada, UK and the US) are ranked below India and Pakistan in Livelihood Security despite high agricultural variability and zero benefits replacement rate experienced by India or Pakistan. This is due to relatively high unemployment rates in these OECD countries in 2011. Even though Livelihood Security is dampened in India and Pakistan due to high agricultural variability, it is not enough to dominate the positive effects on security of relatively low unemployment.

Table 5.1: Index of Security from Loss of Livelihood

Country	Unemployment Rate, 2011	Scaled Un-employment Rate	Replacement Rate, 2011	Scaled Replacement Rate	Index of Security from Unem-ployment	Percent Agricultural Employment	FAO Food Production Index Percent Deviation from Trend, 2011	Index of Agricultural Deviation	Index of Livelihood Security	Country Ranking
	A	B = Scaled from A	C	D = Scaled from C	E = **0.8*B + 0.2*D**	F	G	H = Scaled from G	I = H*(F/100) + E*(1 - (F/100))	J
South Asia:										
Bangladesh	4.50	0.7500	0.00	0.0000	0.6000	47.30	37.54	0.0833	0.3556	7
India	3.50	0.8889	0.00	0.0000	0.7111	51.10	25.98	0.2740	0.4877	3
Pakistan	6.00	0.5417	0.00	0.0000	0.4333	45.10	14.16	0.4689	0.4494	5
Europe:										
France	9.30	0.0833	35.47	0.8607	0.2388	2.90	-8.22	0.8380	0.2562	9
Germany	5.90	0.5556	20.71	0.5026	0.5450	1.60	8.27	0.5661	0.5453	2
Norway	3.30	0.9167	30.83	0.7481	0.8829	2.50	-11.46	0.8915	0.8832	1
Sweden	7.50	0.3333	37.47	0.9091	0.4485	2.10	-12.99	0.9167	0.4583	4
United Kingdom	7.80	0.2917	11.41	0.2768	0.2887	1.20	0.21	0.6990	0.2936	8
North America:										
Canada	7.40	0.3472	15.02	0.3645	0.3507	2.40	7.62	0.5767	0.3561	6
United States	8.90	0.1389	22.64	0.5493	0.2210	1.60	-0.10	0.7041	0.2287	10

Column A: World Bank Indicators, World Bank 2011 & Pakistan Labour Force Survey 2010-11 & Bangladesh Labour Force Survey 2010

<http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS>

<http://www.pbs.gov.pk/sites/default/files/Labour%20Force/publications/lfs2010.11/summary_of_findings.pdf>

<http://www.ilo.org/public/libdoc/igo/2010/480597.pdf>

Column C : OECD, Tax-Benefit Models, <www.oecd.org/els/soc/GRR.EN.xlsx> , 2011

Column F: KILMnet, International Labour Organization: Key Indicators of the Labour Market, 7th Edition, <http://kilm.ilo.org/kilmnet/>, 2011 or the most recent.

Note for Bangladesh and Pakistan, their respective Labour Force Survey reports are used. The links are same as above.

Column G: FAOSTAT, Food and Agriculture Organization of UN, Gross value FAO per capita Food Production Index 2004-2006 base,

<http://faostat.fao.org/site/612/DesktopDefault.aspx?PageID=612#ancor>, 2011

However if equal weights are given to employment and benefit replacement rates[13] in the Index then only France and Canada jump ahead of India and Pakistan while UK and the US still lags behind as shown in Table 5.2. The weighting scheme is, therefore, an important methodological decision that has a bearing on the results of our index. The credibility of this conscious decision must be verified before making any final recommendations on country's performance.

A caveat is in order, however, when we use the published' unemployment rates as reported by International Labour Organization (ILO) or World Bank especially for the three South Asian countries in our sample. It is an intriguing research question whether unemployment rates as reported by various domestic labour agencies are comparable across different nations. Although many OECD countries use a similar'search' criterion, nevertheless as noted by Riddell (2005), survey design and administration are important determinants and might render unemployment rates incomparable between countries.

This problem becomes more serious when comparing the'published' unemployment rates of affluent and poor countries. In developing countries, like the three South Asian countries in our sample, there is not any financial support for the unemployed and the 'search' criterion is not very well defined. Therefore the very low unemployment rates as reported for Bangladesh (4.5%), India(3.5%) and Pakistan (6%) might raise some questions as to their credibility. For example, the Pakistan Bureau of Statistics (PBS), in its calculation of unemployment rate, considers those with even marginal attachment to employment as employed. As there is no official unemployment protection available, people tend to engage in any sort of economic activity irrespective of any considerations regarding the size and duration of reward. So people might be working but not able to work as much as they want. Technically they are 'underemployed' but not counted as such. The PBS estimates this underemployment to be 1.19% in 2010-11 period which suggest that the official unemployment rate might be underestimated. Also The size of informal sector in developing countries is usually huge, for example in Pakistan it was nearly 74% of the non-agricultural workers, which might reduce the credibility of the official unemployment figures.[14]

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[13]Remember in Table 5.1 they were given weights of 0.8 and 0.2 respectively.
[14]See Pakistan Labour Force Survey 2010-11: Pages 6, 8, 28, 31, 33;

Table 5.2: Index of Security from Loss of Livelihood

Country	Unemployment Rate, 2011	Scaled Un-employment Rate	Replacement Rate, 2011	Scaled Replacement Rate	Index of Security from Unem-ployment	Percent Agricultural Employment	FAO Food Production Index Percent Deviation from Trend, 2011	Index of Agricultural Deviation	Index of Livelihood Security	Country Ranking
	A	B = Scaled from A	C	D = Scaled from C	E = 0.5*B + 0.5*D	F	G	H = Scaled from G	I = H*(F/100) + E*(1 - (F/100))	J
South Asia:										
Bangladesh	4.50	0.7500	0.00	0.0000	0.3750	47.30	37.54	0.0833	0.2370	10
India	3.50	0.8889	0.00	0.0000	0.4444	51.10	25.98	0.2740	0.3573	7
Pakistan	6.00	0.5417	0.00	0.0000	0.2708	45.10	14.16	0.4688	0.3601	6
Europe:										
France	9.30	0.0833	35.47	0.8607	0.4720	2.90	-8.22	0.8380	0.4826	4
Germany	5.90	0.5556	20.71	0.5026	0.5291	1.60	8.27	0.5660	0.5297	3
Norway	3.30	0.9167	30.83	0.7481	0.8324	2.50	-11.46	0.8915	0.8338	1
Sweden	7.50	0.3333	37.47	0.9091	0.6212	2.10	-12.99	0.9167	0.6274	2
United Kingdom	7.80	0.2917	11.41	0.2768	0.2843	1.20	0.21	0.6990	0.2892	9
North America:										
Canada	7.40	0.3472	15.02	0.3645	0.3559	2.40	7.62	0.5767	0.3612	5
United States	8.90	0.1389	22.64	0.5493	0.3441	1.60	-0.10	0.7041	0.3498	8

5.2 Security from Cost of Sickness

Sickness may not only be physically costly but it might also entail high economic costs if individuals are not properly covered by insurance. In poor countries, where the problem of sickness is most acute, insurance seems to be absent most of the time and public infrastructure (hospitals, physicians etc.) is usually overburdened. Sickness, therefore, causes severe financial distress for families. However, it is not only limited to poor countries. There are some examples of developed economies where adequate public health services may not available to everyone. For example, according to the U.S. Census Bureau an estimated 45.7 million American (15.3% of the total population) had no health insurance coverage in 2007.[15] In the absence of adequate coverage, the risk of financial loss increases in the event of some major illness to an individual or his/her family member and therefore the 'Security from Cost of Sickness' is an important element of the overall 'Index of Economic Security'.

Clearly the 'cost of sickness' comprise those financial costs that are not covered under any public or private insurance programs. Therefore these uncovered financial costs are the basis of calculating the index of Security from Sickness. However, a distinction must be made between 'medically necessary' medical expenditure and those that are 'discretionary'. Conceptually discretionary medical expenses do not contribute towards 'insecurity', only the uncovered necessary medical expenses pose potential financial risks. However, data available on health care expenditures does not make this distinction and only reports the total health care expenditure. Therefore the financial costs imposed by uncovered necessary health care must be estimated from total health care expenditure. Thus an important assumption has to be made i.e. the unreimbursed total healthcare expenditures are proportionate to unreimbursed necessary healthcare expenditures,[16] as fraction of disposable income.[17]

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[15]See *Income, Poverty, and Health Insurance Coverage in the United States:2007* report by U.S. Census Bureau (2008: 19). Link: http://www.census.gov/prod/2008pubs/p60-235.pdf

[16]This assumption is justifiable if the income elasticity and insurance coverage of medically discretionary health care expenditures are same across nations or over time. For more details see Appendix I of Osberg (2009)

[17]Note that the unreimbursed health care expenditure is expressed as a percentage of disposable income since individuals have to make these out-of-pocket expenditures from the available disposable

However, there is huge disparity between the health care systems in rich and poor countries. In rich countries most of the health care costs are borne by the public sector while in poor countries health care system consists of a network of profit and non-profit facilities while public dispensaries and hospitals serves a complementary purpose. The financial costs, therefore, are relatively more burdensome for people in poor nations. Kruk, Goldmann, & Galea (2009) used a sample of forty low- and middle-income countries[18] to calculate the frequency of borrowing money or selling assets to buy health services. They found that on average, 25.9 percent of households borrowed money or sold assets to pay for health care. Similarly Sengupta (2005) also noted that out-of-pocket health expenditures are a leading cause of impoverishment in India.

Furthermore in poor countries there is a problem of high expenditures (as percentage of disposable income) on food items which leave little income to be spent on necessary medical expenses. For instance, in our sample the three relatively poor countries (Bangladesh, India and Pakistan) spend nearly 50% of the household income on food while for the seven OECD countries this ratio on average is only 18.4%.[19] This means that from the perspective of measuring security from cost of sickness for a sample including both rich and poor countries, it is important to account for high expenditures on food and other necessities. Conceptually then a better measure of risk of cost of sickness is out-of-pocket expenditure as a percentage of'disposable income after food'. Note that if the sample only included rich countries then risk of sickness could very well be approximated using the previous concept i.e. measuring unreimbursed(out-of-pocket) health care expenditure as a percentage of'disposable income'.[20]

Column A of Table 5.3 reports the per capita total health care expenditures while the next two columns B and C give the percentage of health care costs borne by private

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incomes. Therefore the more the disposable income, the more security there will be in the event of sickness.

[18]The combined population of these countries were 3.66 billion or 58% of the world's population.

[19]Source: FAO Statistics Household Survey Database; International Labour Organization (ILO) and country publications, 2010 or most recent.

[20]Spending on food in rich countries is usually a small percentage of disposable income so its omission can possibly be justified.

sector and the percentage of those costs that are not reimbursed by the private sector, respectively. Column D then calculates the Out-of-pocket expenditures as percentage of total expenditure on health from the preceding two columns.

There is no international database that tracks household disposable income globally. This variable may be approximated by GDP per capita; therefore column E reports the GDP per capital (PPP) at current international dollars. Column F then calculates out-of-pocket expenditure as a percentage of GDP per capita. Because the risk of financial cost of sickness must account for food expenditures, the next column G reports the share of food consumption expenditure in total household expenditure obtained from Food and Agriculture Organization (FAO). Column H then calculates the out-of-pocket expenditure as percentage of GDP per capita after adjustment for food expenditure share. Column I then uses linear scaling to standardize the values in column H and finally Column J ranks the countries according to their performance in the Index of Security from Cost of Sickness.

It is not surprising to note that the three South Asian countries in the sample ranked the lowest. However what is interesting to note is, the United States ranked the least among the OECD group and it is not very far away from Pakistan on the linear scale. Even though per capita total health expenditure in United States is more than a hundred times compared to Pakistan[21], still United States is only few points above Pakistan in the Index of Security from cost Sickness. This is due to the fact that the focus of this index is on the'financial risks' which health care costs impose on households and the economic insecurity this implies and not on the quality of health and living standards available to the people in their respective countries. Even though the general quality of health in United States is much better than Pakistan, but it is quite expensive to afford that health in United States compared to Pakistan. To emphasize it again, our index here only measure these financial costs and not the quality of health care.[22]

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[21] Other OECD countries in the sample have much lower per capita health expenditures.

[22] A more comprehensive measure of well-being that accounts for quality of health and other essential conditions for life is the Human Development Index (HDI). It is a composite index of Life Expectancy, Education and economic resources (GDP per capita) available to people.

Table 5.3: Index of Security from Cost of Sickness

Country	Per Capita Total Health Spending, PPP int. $, 2010	Private Expenditure on Health as % Total on Health, 2010	Out of Pocket Expenditure on Health as % Private Expenditure on Health, 2010	Out of Pocket on Health as % Total on Health Spending	GDP per Capita PPP US Current $, 2011	Out of Pocket on Health as % of GDP per Capita	Food as % of Household Spending	Out of Pocket Health Costs as % of Income after Food Spending	Index of Security from Cost of Sickness	Country Ranking
	A	B	C	$D = 100*(B/100)*(C/100)$	E	$F = (A*(D/100)/E)*100$	G	$H = (F/(100-G))*100$	$I = $ Scaled from H	J
South Asia:										
Bangladesh	61	63.50	96.60	61.34	1,777	2.11	53.81	4.5590	0.0833	10
India	126	71.80	86.00	61.75	3,650	2.13	49.50	4.2207	0.1643	9
Pakistan	75	65.20	81.90	53.40	2,745	1.46	47.61	2.7849	0.5080	8
Europe:										
France	3997	23.10	32.20	7.44	35,366	0.84	22.00	1.0778	0.9167	1
Germany	4342	23.20	51.40	11.92	39,456	1.31	18.50	1.6101	0.7892	4
Norway	5391	14.50	94.50	13.70	60,392	1.22	16.90	1.4719	0.8223	3
Sweden	3760	19.00	88.80	16.87	41,484	1.53	17.40	1.8514	0.7315	5
United Kingdom	3433	16.80	53.10	8.92	35,598	0.86	22.60	1.1115	0.9086	2
North America:										
Canada	4443	28.90	49.00	14.16	40,420	1.56	17.50	1.8868	0.7230	6
United States	8233	51.80	22.70	11.76	48,112	2.01	13.90	2.3370	0.6152	7

Column A, B, C, E: World Health Statistics 2013, <http://www.who.int/gho/publications/world_health_statistics/EN_WHS2013_Full.pdf>, 2010 or most recent

Column G: "Share (%) of food consumption expenditure on total consumption expenditure." , Food & Agriculture Organization of the UN, <http://www.fao.org/search/en/?cx=018170620143701104933%3Aqq82jsfba7w&q=food+consumption+expenditure&cof=FORID%3A9&siteurl=www.fao.org%2Fhome%2Fen%2F&ref=&ss=10564j10584780j30>,2009 or most recent

5.3   Security in the Event of Widowhood

The consequences of losing male earnings in the event of husband's death are severe for a non-earning widow and her children. This is true, at least in the context of poor countries where cultural norms dictate the presence of nuclear families with well-defined and traditionally established social responsibilities for both spouses. Males take the responsibility of 'bread-winning' while females are confined to their homes caring for children. Majority of poor country population live in such situation and the death of male-spouse represent high risk of poverty for women and their children which in poor countries represent the majority of population. According to our calculations, married women and their children in Bangladesh, India and Pakistan constitute more than 60% of the population.[23]

However, in poor countries the notion of 'extended families' is still present and households with familial links may still have economic ties with each other. So if a 'nuclear' family losses its male earnings due to death of a husband, there is a possibility of mitigating the risk of poverty through informal private transfers between households in the extended family. Thus despite the absence of public social assistance programs and functional capital and insurance markets, informal private transfers serves as an alternative mechanism. Researchers have found evidence of such inter-household private transfers even in developed countries. For example Cox & Jimenez (1990), through secondary research, found that among a sample of urban poor in El Salvador, 33 percent reported having received private transfers, and income from private transfers accounted 39 percent of the total income of recipients. In a sample of rural India, 93 percent of households received private transfers from other households. In urban Nairobi, Kenya nearly 90 percent of the household gave private transfers to other households. In Malaysia, one-fifth of the least poor households received 46 percent of their incomes through private transfers (Cox & Jimenez, 1990: 207). Evidence also suggests that females or female headed households are more likely to receive private

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[23]See Appendix A

transfers and that too in larger amounts than their male counterparts.[24] One simple reason may be that females usually live longer than males and may get more of the old-age transfers. Another reason, as noted by Ainsworth (1989), is that private transfers compensate females for discrimination in formal labour market. He argues that if discrimination hold females back from the formal labour market, they may engage in other activities that entail transfers but are, in reality, payment for services rendered – such as child rearing and fosterage.

Though these voluntary private transfers within the extended family in hard times are common, even in the more developed countries, such transfers are usually motivated by feelings of altruism and not considered a right of the recipient or obligation of the donor. Only in countries or regions that follow the 'Sharia Law' where the teachings of Quran on the duty of men to care for their brother's widows and orphaned nieces and nephews have legal force, can private transfers be considered legal rights of widows. In order to measure economic security, certainty to access of resources is an important determinant, and 'altruism' per se cannot replace the certainty that is needed to ensure security for the widow and their children. Furthermore in countries where Sharia law is said to be followed and where widow 'should' be guaranteed protection, the law is usually only enforceable in very limited capacity. For example, in Pakistan Sharia law is only enforced in the tribal regions through the process of 'Jirga' (tribal courts) and population living in tribal region are minority compared to overall population. Therefore a vast majority of women are still exposed to that uncertainty that is inherent in the 'altruism' motive of private transfers.

Besides, research has indicated that private transfers are an imperfect replacement of public social assistance and private capital and insurance markets. For example, Foster & Rosenzweig (2001) used three panel data sets from South Asia (specifically from Pakistan and India) to examine the role of altruism in determining the degree of insurance provided by informal risk-sharing arrangements (e.g. inter-household private transfers) in a setting in which households are unable to enter into binding contracts. The empirical evidence suggests that there are commitment issues on part

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[24]Salvadorian households in Kaufmann & Lindauer (1986), Botswana individuals in Lucas & Stark (1985), Peruvian households in Cox & Jimenez (1989) and U.S. households in Cox (1987)

of households that limit their capability to fully insure themselves against idiosyncratic risk even in the presence of altruistic ties between them. In a similar study, Witoelar (2005) found evidence against income pooling within extended families in Indonesia during the period of Southeast Asian economic crisis in the late 1990s. He argues that households within an extended family do pool their resources, at least to some degree, but such pooling may not be enough to smooth consumption of the less-privileged households.

In short, poor countries might lack the public social security systems and functional capital and insurance markets, but they may have their own informal networks of private transfers to help the less privileged individuals of society (widows, old, disabled etc.). However these informal arrangements may only serve as an imperfect substitute and people therefore are still exposed to the risk of poverty in the event of widowhood or old-age (or any other hazard).

When the right of 'Security from Widowhood' was made part of the Universal Declaration of Human Rights in 1948 most of the signatories were industrial economies and the social context in these countries was that of a nuclear family in an industrial economy – specifically, the "male bread-winner-model" of a single earner household with unemployed spouse. The proportion of 'single-parent' families was quite high mainly because of casualties in the Second World War, and "widowhood" was the principal reason why women and their children 'lost access to male earnings'.

However, according to the Gender Brief prepared by OECD policy division for its member nations, dual-earner families is now the most common model among couple families in majority of OECD countries. For example more than 70% of the couple families with children aged 0-14 in United States had both their parents working full-time in 2007 which is the highest among OECD countries. In France, Sweden and Spain it was close to 40% while in UK and Australia it was slightly above 25%.[25] On average in OECD, two-earner families comprise approximately 35% of all the couple families with children aged 0–14 whereas one-and-a-half earner families were little

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[25]However the percentage of one-and-a-half (one parent full-time and one parent part-time) earner households in UK and Australia was near 40% whereas for France, Sweden and Spain it varied from approximately 13% to 33% in 2007.

above 20% with a lot of variation in between the counties.[26]

Furthermore the divorce rate is on the rise in OECD countries and this is the main reason now why many women with children lose 'access to male earnings'. Majority of the OECD countries have divorce rate above 2.0 which in 1970 was below one or only slightly above one. In United States, divorce rates have traditionally been high and increased only slightly compared to 1970. In Switzerland, UK and Norway the divorce rate were slightly below one in 1970 but now they are in the range of 2.2 to 2.4.[27]

This suggest that the main source of 'lost access to male earnings' for women and children in OECD countries has changed since World War II from 'male mortality' to 'divorce or separation'. Forster & d'Ercole (2005) calculated the relative poverty rates[28] in OECD countries for single-parent families for 2000 and found that poverty rate, on average, for single-parent families was three times higher than for all families with children. However among those where the single parent was jobless, the poverty rate reached 57% whereas it was only 21% when the single-parent was employed. Since, most of the single-parent families are headed by women[29], the risk of poverty from losing spouse earnings is most profound for women and therefore we choose to ignore single male-parent household in our Index of Security from Widowhood.

Women in developed countries who are defined as head of household are economically and socially empowered to make decisions about household members. This may not be true in traditional societies like the three South Asian countries in our sample. For example in Pakistan, a surveyor may find a widow assigned the head of household status out of respect for her being the eldest in the family (Khalid & Akhtar, 2011). Another possibility is the migration of the male spouse which leaves the female spouse de-facto head of household but financially she would still be dependent

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[26]For example in Turkey the two-earner families were approximately 12% whereas the single-earner families were 65% of the total.

[27]See Gender Brief (2010) of OECD Policy division

[28]Poverty rate was calculated using a poverty threshold of 50% of median income for the entire population.

[29]According to the Gender Brief of OECD policy division 85% of the single-parent households were headed by women.

on remittances. Joshi (2004) found that female-headed household in Bangladesh typically fall into two categories: households headed by widows and households headed by married women, most of whom are wives of migrants and receive remittances. As a results female headed household may experience less poverty compared to male headed household (as found by Khalid and Akhtar in case of Pakistan, 2011) simply because they receive remittances from their spouses abroad. One should therefore be cautious when comparing poverty outcomes among female-headed households between countries with various contextual backgrounds. Efforts are needed, on an international scale, to ensure that micro data collection procedures are analogous in order to ensure comparability of results across nations.

The risk of becoming poor because of family break-up is modeled in an 'expected value' sense as follows:

Index of Security from Widowhood[30]

$$= \text{(the probability of divorce)}$$

$$* \text{(the poverty rate among single female parent families)}^{31}$$

$$* \text{(average poverty gap ratio among single female parent families)} \quad (5.3)$$

However for poor countries, 'male mortality' is more important than family breakup as a source of loss of male earnings. For example for all the three South Asian countries in my sample, the divorce rate is quite low (below 1 for all three)[32], whereas male mortality is in the range of 3.6 to 5.5 which from OECD standards is quite high. United States has the highest male mortality of 2.9 among the OECD countries in my sample. It is therefore essential to adjust the Index of Security from Widowhood to ensure a comparable cross-country risk measure.

Table 5.4 reports the probability of divorce and the annualized risk of adult male mortality in columns A and B respectively. Column C adds the preceding two columns to give an estimate of the 'annual hazard of the loss of male earnings' either due to

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[32]It is very difficult to come up with the 'real' divorce rate in these countries and the 'official' divorce numbers are usually underestimated. According to one estimate (Daily Times, 2008), in Pakistan only 10% of the divorce cases get registered while the rest do not get accounted for. Marital dissolution is traditionally an informal process that takes place without any formal court proceedings and therefore it is quite difficult to estimate the real divorce rates in these countries.

death or divorce.[33] This measure would replace the 'probability of divorce' in equation (3) to calculate the Index of Security in the Event of Widowhood for our sample of countries.

The next two columns (D and E) report the relative poverty rate and average poverty gap. Note that relative poverty rate is different from absolute poverty rate. Absolute poverty rate is calculated as the proportion of people that lie below a particular dollar poverty line (PPP adjusted) which is defined to be the global poverty line.[34] Osberg(2010) argued that the purpose is to measure 'insecurity' about future and because insecurity refers to individuals' own perceptions of vulnerability, it is the subjective anxieties of local people which matter, and that the local norms of deprivation dictate those anxieties. People consider themselves poor if they are worse off relative to others in their locale and their anxieties are a result of these relative considerations. Therefore using a relative poverty line of one-half the mean[35] income is better to reflect these circumstances.

However advocates of absolute poverty line argue that poverty rate should measure the proportion of people who are unable to maintain a standard of living necessary for subsistence. An absolute poverty line (for example$2 a day per person, measured in PPP terms) will account for the cost of the bundle of commodities that is necessary to subsist and therefore it will measure the deprivation of all humans irrespective of what the local norms are.

This paper adopts a conservative position between poverty line relativism and absolutism. Assume P_A is the absolute $2 per day (PPP adjusted) poverty line and P_R is the relative poverty line defined as the 'one-half the mean income', then

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[33]Here we implicitly assume that the loss of male earnings due to death or divorce have similar implications for the households that is why we are simply adding the two probabilities. In some social contexts this might not be a reasonable assumption as the social and economic consequences of being a widow might be far more extreme than being a divorcee. For example in India, being widowed is considered a social stigma and women might be deprived off their basic human rights.

[34]The most common absolute poverty lines are $1 a day poverty line and $2 a day poverty lines.

[35]Osberg (2010) has used 'one-half the median' equivalent income as the income poverty line which is a better measure but due to unavailability of micro data on distribution of income, we use the one-half 'mean' income criterion.

poverty line P in a given country should be P = max[P_A , P_R].[36] According to this criteria, the figures reported in column D and E of Table 5.4 for OECD countries reflect relative poverty measures while for the three South Asian economies absolute poverty estimates are reported.[37]

Column F calculates the risk of single parent poverty as the product of annual hazard (column C), poverty rate (column D) and average poverty gap (column E). Column G scales this risk according to linear scaling and column H ranks the countries in sample according to their performance in the Index of Security from Widowhood.

The results of table 5.4 are quite obvious with Pakistan, Bangladesh and India ranking the least among the sample. Not only the male mortality in these countries is high, also the poverty rate and depth are quite high relative to their OECD counterparts. The United States ranks the lowest among the OECD countries mainly because it is an outlier in all categories. It has the highest divorce and male mortality rate among the OECD and also the highest poverty rate and depth.

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[36] For more detail on the arguments between adopting relative versus absolute poverty line, see Osberg (2010)

[37] Due to unavailability of data regarding poverty rate and depth of the married female population in Bangladesh, India and Pakistan, this paper will use the national rate and depth of poverty to approximate poverty of female single-parent household.

Table 5.4: Index of Security from Widowhood

Country	Annual Divorce Rate per 1000	Annualized Adult Male Mortality Rate	Annual Hazard (Divorce + Widowhood)	Poverty Rate	Poverty Gap	Risk of Female Single Parent Poverty	Index of Security from Widowhood	Country Ranking
	A	B	C = A + B	D	E	F = C x D x E/1000	G = Scaled from F	H
South Asia:								
Bangladesh	0.80	3.62	4.42	75.80	39.21	13.1329	0.1047	9
India	0.14	5.49	5.63	67.87	35.16	13.4230	0.0849	10
Pakistan	0.33	4.13	4.46	59.10	29.39	7.7487	0.4718	8
Europe:								
France	2.04	2.51	4.55	16.90	26.68	2.0502	0.8602	4
Germany	2.29	2.13	4.42	14.85	25.01	1.6420	0.8881	3
Norway	2.06	1.71	3.77	11.38	26.71	1.1463	0.9219	2
Sweden	2.48	1.58	4.06	9.58	24.76	0.9627	0.9344	1
United Kingdom	2.05	2.02	4.07	23.23	30.72	2.9045	0.8020	6
North America:								
Canada	2.11	1.87	3.97	19.76	31.45	2.4700	0.8316	5
United States	3.70	2.91	6.61	27.07	36.99	6.6208	0.5487	7

Column A: UN Demographic Yearbook 2011 (Table 25), <http://unstats.un.org/unsd/demographic/products/dyb/dyb2011.htm>

UN World Marriage Data 2008, <http://www.un.org/esa/population/publications/WMD2008/WP_WMD_2008/Data.html>

For Bangladesh, India and Pakistan, Author used following sources and self-calculations to come up with annual divorce rate:

Bangladesh: Wrold Bank Indicators and World Marriage Data 2008

India: World Bank Indicators, <http://news.bbc.co.uk/2/hi/business/7798865.stm>, <http://www.divorcerate.org/divorce-rate-in-india.html>

Pakistan: Reuters, <http://in.reuters.com/article/2013/01/09/pakistan-divorce-taboo-idINDEE90802X20130109>, Pakistan's capital Islamabad Divorce rate is used here.

Column B: World Health Statistics 2013, <http://www.who.int/gho/publications/world_health_statistics/EN_WHS2013_Full.pdf>, 2010 or most recent

Column F, G: Primary Source: "PovcalNet: the on-line tool for poverty measurement developed by the Development Research Group of the World Bank"

< http://iresearch.worldbank.org/PovcalNet/povcalSvy.html>

Secondary Source: LIS datacentre (for all OECD countries), 2004 or the most recent year

5.4 Security in the Event of Old-Age

Old age is almost always coupled with the risk of diminished earnings capacity and therefore the Old experience relatively high risk of being unable to work and earn very low incomes. People may therefore start to plan for their old age when they are young and still able to work. They can do this through different mechanisms of savings, investing in children education etc. Government funded social security programs are also available, at least to some extent in affluent countries in order to help the Old overcome the miseries of old age. However people who are already poor in their working age may not be able to build the private protection mechanisms necessary to sustain them in their old age or the public social security might not be enough (it might be completely absent as the case in most poor countries) to guarantee providing adequate security against the risk of poverty.

The event of poverty in old age, therefore, contributes to economic insecurity and should be accounted for in the overall index. Conceptually it is driven by considerations of risk of getting poor in old age, thus, the Index of Security from Old Age is defined as the poverty intensity (= poverty rate * average poverty gap ratio) experienced by households headed by people aged 65 or over.

The consideration of security for the Old varies from country to country simply because of vast demographic differences. In countries where life expectancy at adulthood is low (for example in many developing countries) majority of the people do not expect to survive long enough to 'enjoy' the old age. Furthermore those that do survive make very small proportion of population as population in developing countries is relatively young and their age structure resembles a pyramid that is very thin at the top and quite fat towards the bottom. Therefore old age security does not enjoy enough consideration in public policy discussion. However, countries around the world are undergoing what is called 'demographic transition' – i.e. countries start with a high and stable birth and mortality rate, but then due to development and education, mortality and birth rates start to decline and eventually countries reach a point of stable population with low and stable birth and mortality rates.

Most of the industrialized countries have achieved population stability as they have

very low birth and mortality rate (birth rate on average in more developed countries was 11 in 2005-2010 and mortality rate was only 8 per thousand).[38] This results in age cohorts that are comparatively of even size. However, countries that are part of the less developed world have quite high birth rates but due to advancement is medicine and globalization their mortality rate are quite low - for example in Somalia there was a great variation between the birth rate (46) and death rate (14) in 2005-2010 (United Nations, 2013). This results in quite steep pyramid shaped age structures, with each younger generation significantly larger than the previous cohort. However for countries in the Latin America, Caribbean some other parts of the world (South Africa, and some part of Asia etc), the birth rates are rapidly declining – for example in Bangladesh birth rate decline by almost 50% from 42 in 1980-85 to 22 in 2005-2010.[39] This suggest that the average (or median) age of the population in the less developed regions of the world in going to increase in the future and we are going to see more and more aging of population.

This demographic transition means that the proportion of elderly population will eventually increase. The countries (except Pakistan) in my sample will undergo significant change in the age of their elderly (above 65) population according to 'medium variant' population projection of the UN estimates. By 2030 Germany will have the highest proportion of elderly population (36.4%) whereas Pakistan will have the lowest (5.8%), with France (29.2%), Canada (28.5%), Sweden (22.0%), UK (21.7%), the U.S. (20.1%), Norway (20.0%), India (12.3%) and Bangladesh (11.7%) in between.[40]

As mentioned before, in affluent countries people have private or social protection mechanism to guard themselves against poverty in old age however such mechanism might be totally nonexistent or rare in poor nations. In poor nations elderly often live with their extended families and continue to work until later age in order to survive. As a result there might not be much difference between the poverty of the elderly and of younger cohorts.

To give a glimpse of the conditions of health and living conditions of elderly

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[38]Source: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, CD-ROM Edition.

[39]See http://esa.un.org/unpd/wpp/Excel-Data/fertility.htm

[40]See http://esa.un.org/unpd/wpp/unpp/panel_indicators.htm

in poor countries, we will use Pakistan as a case study. A survey was conducted by Pakistan Medical Research Council (PMRC)[41] in 2001 in two phases. A total of 2,899 households were surveyed regarding the health and living conditions of members of households aged 60 years or above. They found some interesting statistics that is typical of a developing country. After the age of 60, a third of elderly people were still working[42], which as we have highlighted earlier might be a result of absence of old age benefits. In their sample, two-third of the elderly live in extended family with their children, one-quarter live in nuclear family while only six percent live alone. Further they also note that nuclear families appear to be living in worse conditions than those in joint families. This reinforces our earlier claim of inter-household risk pooling via private transfers for consumption smoothing. Furthermore 81% of the elderly reported they were dependent on their families out of which 52% were fully dependent and 29% were partially dependent. Only 16.5% of the elderly in sample were receiving formal pension payments whereas nearly 39% had no source of income at all. This highlights the lack of public old-age support in Pakistan.

However as noted by Foster & Rosenzweig (2001) that there might be commitment issues on part of families supporting the elderly i.e. households in an extended family may find it difficult to fulfill its commitment to other households (e.g. parents) of providing complete insurance against risk of poverty mainly because all household in extended family might be poor. Commitment problem also plays an important role in other behaviours, specifically the inter-temporal transfer of resources. For example, commitment issues may also play a role in childbearing and parental investment in human capital in developing countries to the extent that children cannot commit to provide parents with a secure source of support in old age (Becker, 1991; Cigno, 2000). Thus, people in poor countries, despite having strong informal social networks, face the possibility of falling into poverty and therefore it is an important determinant in their overall well-being.

Because micro-data is unavailable for the three South Asian countries, it is not possible to calculate measures of elderly poverty rates and density. Therefore Table

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[41]Follow the link http://www.pmrc.org.pk/Elderly-Population-Survey-PMRC.doc

[42]For Tanzania the numbers are similar for elderly. Mboghoina & Osberg (2010) reported that nearly 28% of all Elderly earn their income from full-time work while 6% of them from part-time

5.5 shows calculation of Index of Security from Old Age using the national average rate and depth of poverty (Column A and B). Column D scales the measure of poverty intensity (column C) and Column F shows the country-wise ranking. Again the three South Asian countries rank the lowest, with the United States not very far away.

Table 5.5: Index of Security from Old Age

Country	Poverty Rate	Poverty Gap	Poverty Intensity	Index of Security in Old Age	Country Ranking
	A	B	C = A*B/100	D = Scaled from C	E
South Asia:					
Bangladesh	75.80	39.21	29.72	0.0843	10
India	67.87	35.16	23.86	0.2648	9
Pakistan	59.10	29.39	17.37	0.4648	8
Europe:					
France	16.90	26.68	4.51	0.8611	4
Germany	14.85	25.01	3.71	0.8856	3
Norway	11.38	26.71	3.04	0.9064	2
Sweden	9.58	24.76	2.37	0.9269	1
United Kingdom	23.23	30.72	7.14	0.7801	6
North America:					
Canada	19.76	31.45	6.21	0.8085	5
United States	27.07	36.99	10.01	0.6914	7

Column A, B: Primary Source: "PovcalNet: the on-line tool for poverty measurement developed by the Development Research Group of the World Bank"

<http://iresearch.worldbank.org/PovcalNet/povcalSvy.html>

Secondary Source: LIS datacentre (for all OECD countries), 2004 or the most recent year

5.5 Security in the event of Disability or other loss of livelihood in circumstances beyond one's control

Disability refers to a number of specific hazards, and in developed parts of the world there is some insurance coverage for the disable people. However due to non-availability of comparable international data, it is not possible to include this important element of economic security in our analysis. It is as if we are forcibly putting a zero weight on this dimension of insecurity which is not conceptually justified but there is yet no better alternative.

5.6 Aggregation of components into a single Index of Economic Security

Aggregation and weighting are the final steps in the process of developing a social well-being index. It involves determining a method by which variables will be combined. Sharpe & Salzman (2003) summarized three methods of aggregation used in literature, but only two are relevant in this condition; Arithmetic Averaging and Power Averaging. Both methods will be used to aggregate the components of Economic Security and we will attempt to evaluate whether or not a country's relative performance in the overall Index is affected by what method of aggregation is used.

5.6.1 Simple Arithmetic Aggregation

It is the most common and transparent method used to aggregate components and involves summing the product of each component and its weights. Table 5.6 presents the results of arithmetic averaging using two sets of weight. Equal weighting implicitly assumes that all the named risk components are of equal importance and ignores the proportion of population that is affected by each risk component. For instance, very young people or kids are not affected by the risk of old age (they do not have to worry about it now as they are too young) however equal weighting implicitly assumes that all the people in the country are affected by it.

A better weighting scheme therefore is to weight each risk by the relative size of the population that is deemed to be subject to it. The working age population (i.e.

15 to 64 years) is subject to the risk of unemployment as they are currently either employed or may potentially be employed in the future. All the population is assumed to be at the risk of illness. For risk of female single parent poverty, it is assumed that all married women and their children that are under 18 or 19 years of age are at risk. For risk of old-age, it is assumed that people only start to worry about old age as their retirement years draw closer, therefore people with ages 45-64 are assumed to be subject to this risk.

The specific weights for each component risk are determined by adding up all the proportions of population subject to the four risks and then standardizing it to unity by dividing each proportion of the population by the total.[43] Appendix A shows how these weights are calculated for each country and how the contribution of each component is weighted and aggregated into a single Index of Economic Security.

Proportional weighting has some disadvantages. The demographic structures vary greatly across countries and also shift over time, therefore the proportion of population affected by each risk varies by country and over time. It makes it difficult to evaluate any changes in the Index of Economic Security whether they are caused by changes in the underlying risk components or simply by the changing demographic structure. It is therefore difficult to evaluate the effects of public policy targeted at reducing the risks of economic insecurity because demographic changes are not in control of public officials. Hence a public policy might be successful in, for example, reducing the risk of Old-Age by introducing new benefit schemes but due to the phenomenon of demographic transition, there is now more population that is at the risk of old-age poverty. This might offset the decreases in the Old-Age risk due to policy initiative and imply that the policy is ineffective.

Table 5.6, therefore, reports the aggregate Index of Economic Security using both - Equal Weighting and Proportional Weighing. It also reports the country ranking according to their performance in the overall Index. Most of the countries rank similar no matter which weighting scheme is selected. However the ranking of Sweden and France interchange due to different weighting. This implies that choice of weighting

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[43]For example for Pakistan: 60.2% of working age population + 100% of population subject to illness + 66.35% married women and their children + 12.54% people aged 45 to 64 = 239.09.

scheme might have some effect on country performance and therefore it is important that weights must be selected according to a conceptually sound criterion otherwise methodological choice might have an effect on relative country performance.

Table 5.6: Overall Index of Economic Security (Arithmetic Averaging)

Country	Index of Livelihood Security	Index of Security from Cost of Sickness	Index of Security from Widowhood	Index of Security from Old Age	Overall Index of Economic Security			
					Population Weights	Country Ranking	Equal Weights	Country Ranking
South Asia:								
Bangladesh	0.3556	0.0833	0.1047	0.0843	0.1605	10	0.1570	10
India	0.4877	0.1643	0.0849	0.2648	0.2370	9	0.2505	9
Pakistan	0.4494	0.5080	0.4718	0.4648	0.4809	8	0.4735	8
Europe:								
France	0.2562	0.9167	0.8602	0.8611	0.7184	3	0.7235	4
Germany	0.5453	0.7892	0.8881	0.8856	0.7417	2	0.7770	2
Norway	0.8832	0.8223	0.9219	0.9064	0.8653	1	0.8834	1
Sweden	0.4583	0.7315	0.9344	0.9269	0.7052	4	0.7628	3
United Kingdom	0.2936	0.9086	0.8020	0.7801	0.7010	5	0.6961	5
North America:								
Canada	0.3561	0.7230	0.8316	0.8085	0.6401	6	0.6798	6
United States	0.2287	0.6152	0.5487	0.6914	0.5040	7	0.5210	7

5.6.2 Power Averaging

Power Averaging is a technique which was first developed by Anand & Sen (HDR: 1997) to calculate the Human Poverty Index (HPI).[44] It aggregates the component risks according to $(1/3(X^\alpha + Y^\alpha + Z^\alpha))^{1/\alpha}$. This means that each component is first raised to the power alpha, then the terms are added and then it is multiplied by a factor 1/3 (i.e. it is averaged) and then alpha[th] root is taken.

The motivation of using this methodology for aggregation is explained thoroughly by Anand & Sen (HDR: 1997) without specifying alpha. They presume that an index of deprivation like HPI should have certain qualitative properties: (a) the aggregate index should increase with increase in each factor and (b) the increase of the index should be at an increasing rate as each component risk increase, which means that the index should be convex with respect to each risk component. Alternatively, the index should also decrease at a decreasing rate when any risk component decreases.

To ensure that above properties are satisfied, Anand & Sen (HDR: 1997) illustrated the effects of different values of alpha on the index. If $\alpha = 1$, the formula turns into a simple arithmetic average of the components X, Y, Z. In this case equivalent changes in each variable have similar impact on the index. However, as α increases weight is given to the dimension in which there is most deprivation. Therefore as alpha tends to infinity, the index will tend towards the dimension in which there is most deprivation i.e. zero weights to all other sub-components.[45] To calculate HPI, the value of $\alpha = 3$ is chosen "to give additional but not overwhelming weight to areas of more acute deprivation". (HDR: 2001, pg.241)

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[44]There are two HPI indices: HPI-1 is an index that measures deprivation in three basic dimensions of human development captured in the HDI – A long and healthy life, Knowledge, and A decent standard of living. HPI-2 measures deprivations in the same dimensions as HPI-1 but also includes a fourth component – social exclusion. For more detail see HDR (1997)

[45]Anand & Sen proposed (HDR: 1997, proposition 9, pg.121) that the elasticity of substitution between any two variables in the index is constant and equal to $1/(1-\alpha)$. This means, when α is 1 there is perfect substitutability and when α is infinite there is no substitutability. They concluded that "the usual assumption that as the extent of deprivation in any dimension increases, the weight on further additions to deprivation in that dimension should also increase. For this we need $\alpha=1$. The increase in X compared to increase in Y is $(X/Y)^{\alpha-1}$".

At least two of the four components of our Index of Economic Security correspond to deprivation in society – single-parent poverty and old-age poverty. Although the first two components – Unemployment Security and Security from Cost of Sickness – are not directly deprivation indices but prolonged phases of unemployment and sickness might cause deprivation in the future. Thus we can use power average in the same way as used by HPI to calculate the Index of Economic Security using an alpha similar to the one used by Anand & Sen (HDR: 1997). As noted earlier, this will automatically put more weight on sub-indices where deprivation is severe and less where deprivation is mild.[46]

The results are shown in Table 5.7 along with the results of Index using arithmetic averaging for comparison purposes. The ranking has not changed for seven out of ten countries in my sample. However ranking for France, Germany and Sweden have changed. The reason might be that these three countries are quite close to each other in their performance in the poverty sub-indices (single-parent poverty and old-age poverty) of our Index, and therefore their overall performance is sensitive to changes in aggregation operation. On the other hand, the three South Asian countries are quite deprived and far away from their OECD counterparts on the continuum of performance in poverty sub-indices and therefore changes in aggregation operation does not have much of an impact on their relative rankings. Nevertheless, the preceding analysis suggest that decision about selecting the appropriate aggregation operation is a determinant of performance for some countries in the overall Index, and therefore credibility of the decision criteria must be established before trusting the end results.

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[46]Note that for power averaging to work, it is important for the subcomponents of the index to have a similar range. For HPI, all the sub-indices had a range of between 0 & 100 (since all of them were percentages). In case of Index of Economic Security, the range of the sub-indices of risk is between 0 & 1 since Linear Scaling ensures that they are standardized to this range.

Table 5.7: Overall Index of Economic Security (Arithmetic versus Power Averaging)

Country	Index of Livelihood Security	Index of Security from Cost of Sickness	Index of Security from Widowhood	Index of Security from Old Age	Overall Index of Economic Security			
					Population Weights	Country Ranking	Equal Weights	Country Ranking
South Asia:								
Bangladesh	0.3556	0.0833	0.1047	0.0843	0.1570	10	0.0904	10
India	0.4877	0.1643	0.0849	0.2648	0.2505	9	0.1297	9
Pakistan	0.4494	0.5080	0.4718	0.4648	0.4735	8	0.1883	8
Europe:								
France	0.2562	0.9167	0.8602	0.8611	0.7235	4	0.3182	3
Germany	0.5453	0.7892	0.8881	0.8856	0.7770	2	0.3175	4
Norway	0.8832	0.8223	0.9219	0.9064	0.8834	1	0.3512	1
Sweden	0.4583	0.7315	0.9344	0.9269	0.7628	3	0.3201	2
United Kingdom	0.2936	0.9086	0.8020	0.7801	0.6961	5	0.3022	5
North America:								
Canada	0.3561	0.7230	0.8316	0.8085	0.6798	6	0.2879	6
United States	0.2287	0.6152	0.5487	0.6914	0.5210	7	0.2262	7

5.7   Using a Different Standardization Method: Z-Score Normalization

The overall Index of Economic Security calculated in Table 5.6 and 5.7 used Linear Scaling Technique (LST) to standardize the sub-components to a common range so that they can be aggregated in to a single composite index. We have used different aggregation and weighting techniques to understand how it might affect the underlying index and country's rankings. In this section, we will analyse what will happen to the Index if we adopt a different standardization technique in order to scale variables used in the construction of the Index.

Sharpe & Salzman (2003) provided an overview of methodological choices encountered in the construction of composite index of well-being. There are three techniques to standardize the absolute values of variables: Linear Scaling Technique which linearly scales variable to a uniform range, ordinal response in which experts assign a score to each variable, and Gaussian normalization, or Z-score, in which the standardized variable is number of standard deviations away from its mean.

This section standardizes the variables using Gaussian normalization and evaluate how it is different from Linear Scaling and how might it affect the Index. It involves calculating the Z-score of the values of variable by subtracting the mean of variable from each value and then dividing it by its standard deviation. Unlike LST which scales all the values to a common range, Z-score normalization does not standardize to a common range. It transforms each variable by subtracting the mean and then dividing by standard deviation of the data set – it is likely that some of the data points will be outside of one standard deviation and the range of the Z-score can be anything from 0 to infinity. In short there is no range of the values achieved by Z-score standardization. However, it can be said that Z-score normalization standardize the different variables to a common mean (zero) and standard deviation (one).

Table 5.8 to 5.11 report the results of our sub-indices – Security from loss of Livelihood, Security from Cost of Sickness, Security from single-parent poverty, and Security from Old-Age – using Z-score normalization. When compared to earlier results that used LST for scaling, we note there is some difference between the country rankings. For example, if we compare the results of Table 5.1 and Table 5.8 for Index

of Livelihood Security, we see that the rankings of Bangladesh and United Kingdom have switched. Also the ranking of Sweden and India have switched as well. However for the rest of the three sub-indices, the rankings are unchanged.

Table 5.12 aggregates the sub-indices into the overall Index of Economic Security using Arithmetic Averaging[47] with equal and population weights along with the country rankings. Note that country rankings have not changed in most of the cases when we compare these results with Table 5.6 that used Linear Scaling to aggregate the Index. However the rankings of Sweden and United Kingdom have switched when we compare the results of population weighted Index in the two Tables. This suggests that standardization method may cause some variation in the results and therefore must be selected carefully.

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[47]Note that in this case the use of Power Averaging technique to aggregate the index is conceptually wrong as there is no bounded range of the scaled sub-indices when using Z-score Normalization

Table 5.8: Index of Security from Loss of Livelihood (Using Z-Score Normalization)

Country	Unemployment Rate, 2011	Scaled Unemployment Rate	Replacement Rate, 2011	Scaled Replacement Rate	Index of Security from Unemployment	Percent Agricultural Employment	FAO Food Production Index Percent Deviation from Trend, 2011	Index of Agricultural Deviation	Index of Livelihood Security	Country Ranking
	A	B = Scaled from A	C	D = Scaled from C	E = **0.8***B + **0.2***D	F	G	H = Scaled from G	I = H*(F/100) + E*(1 - (F/100))	J
South Asia:										
Bangladesh	4.50	0.9448	0.00	-1.2598	0.5039	47.30	37.54	-2.0265	-0.6930	8
India	3.50	1.4394	0.00	-1.2598	0.8996	51.10	25.98	-1.2814	-0.2149	4
Pakistan	6.00	0.2028	0.00	-1.2598	-0.0897	45.10	14.16	-0.5197	-0.2836	5
Europe:										
France	9.30	-1.4296	35.47	1.3150	-0.8806	2.90	-8.22	0.9230	-0.8283	9
Germany	5.90	0.2523	20.71	0.2437	0.2506	1.60	8.27	-0.1398	0.2443	2
Norway	3.30	1.5384	30.83	0.9782	1.4263	2.50	-11.46	1.1321	1.4190	1
Sweden	7.50	-0.5392	37.47	1.4599	-0.1394	2.10	-12.99	1.2306	-0.1106	3
United Kingdom	7.80	-0.6876	11.41	-0.4316	-0.6364	1.20	0.21	0.3799	-0.6242	7
North America:										
Canada	7.40	-0.4897	15.02	-0.1693	-0.4256	2.40	7.62	-0.0980	-0.4178	6
United States	8.90	-1.2317	22.64	0.3834	-0.9087	1.60	-0.10	0.3998	-0.8877	10

Source: Please refer to Table 5.1

52

Table 5.9: Index of Security from Cost of Sickness (Using Z-score Normalization)

Country	Per Capita Total Health Spending, PPP int. $, 2010	Private Expenditure on Health as % Total on Health, 2010	Out of Pocket Expenditure on Health as % Private Expenditure on Health, 2010	Out of Pocket on Health as % Total on Health Spending	GDP per Capita PPP US Current $, 2011	Out of Pocket on Health as % of GDP per Capita	Food as % of Household Spending	Out of Pocket Health Costs as % of Income after Food Spending	Index of Security from Cost of Sickness	Country Ranking
	A	B	C	$D = 100*(B/100)*(C/100)$	E	$F = (A*(D/100)/E)*100$	G	$H = (F/(100-G))*100$	I = Scaled from H	J
South Asia:										
Bangladesh	61	63.5	96.6	61.34	1,777	2.11	53.81	4.56	-1.9542	10
India	126	71.8	86	61.75	3,650	2.13	49.50	4.22	-1.6627	9
Pakistan	75	65.2	81.9	53.40	2,745	1.46	47.61	2.78	-0.4255	8
Europe:										
France	3997	23.1	32.2	7.44	35,366	0.84	22.00	1.08	1.0455	1
Germany	4342	23.2	51.4	11.92	39,456	1.31	18.50	1.61	0.5868	4
Norway	5391	14.5	94.5	13.70	60,392	1.22	16.90	1.47	0.7059	3
Sweden	3760	19	88.8	16.87	41,484	1.53	17.40	1.85	0.3789	5
United Kingdom	3433	16.8	53.1	8.92	35,598	0.86	22.60	1.11	1.0165	2
North America:										
Canada	4443	28.9	49	14.16	40,420	1.56	17.50	1.89	0.3484	6
United States	8233	51.8	22.7	11.76	48,112	2.01	13.90	2.34	-0.0395	7

Source: Please refer to Table 5.3

Table 5.10: Index of Security from Widowhood (Using Z-score Normalization)

Country	Annual Divorce Rate per 1000	Annualized Adult Male Mortality Rate	Annual Hazard (Divorce + Widowhood)	Poverty Rate	Poverty Gap	Risk of Female Single Parent Poverty	Index of Security from Widowhood	Country Ranking
	A	B	$C = A + B$	D	E	$F = C \times D \times E/1000$	$G =$ Scaled from F	H
South Asia:								
Bangladesh	0.80	3.62	4.42	75.80	39.21	13.13	-1.7340	9
India	0.14	5.49	5.63	67.87	35.16	13.42	-1.7976	10
Pakistan	0.33	4.13	4.46	59.10	29.39	7.75	-0.5556	8
Europe:								
France	2.04	2.51	4.55	16.90	26.68	2.05	0.6916	4
Germany	2.29	2.13	4.42	14.85	25.01	1.64	0.7809	3
Norway	2.06	1.71	3.77	11.38	26.71	1.15	0.8894	2
Sweden	2.48	1.58	4.06	9.58	24.76	0.96	0.9296	1
United Kingdom	2.05	2.02	4.07	23.23	30.72	2.90	0.5046	6
North America:								
Canada	2.11	1.87	3.97	19.76	31.45	2.47	0.5997	5
United States	3.70	2.91	6.61	27.07	36.99	6.62	-0.3088	7

Source: Please refer to Table 5.4

Table 5.11: Index of Security from Old Age (Using Z-score Normalization)

Country	Poverty Rate	Poverty Gap	Poverty Intensity	Index of Security in Old Age	Country Ranking
	A	B	$C = A*B/100$	D = Scaled from C	E
South Asia:					
Bangladesh	75.80	39.21	29.72	-2.0800	10
India	67.87	35.16	23.86	-1.4360	9
Pakistan	59.10	29.39	17.37	-0.7227	8
Europe:					
France	16.90	26.68	4.51	0.6910	4
Germany	14.85	25.01	3.71	0.7783	3
Norway	11.38	26.71	3.04	0.8525	2
Sweden	9.58	24.76	2.37	0.9258	1
United Kingdom	23.23	30.72	7.14	0.4020	6
North America:					
Canada	19.76	31.45	6.21	0.5034	5
United States	27.07	36.99	10.01	0.0858	7

Source: Please refer to Table 5.5

Table 5.12: Overall Index of Economic Security (Z-score Normalization)

Country	Index of Livelihood Security	Index of Security from Cost of Sickness	Index of Security from Widowhood	Index of Security from Old Age	Overall Index of Economic Security			
					Population Weights	Country Ranking	Equal Weights	Country Ranking
South Asia:								
Bangladesh	-0.6930	-1.9542	-1.7340	-2.0800	-1.5711	10	-1.6153	10
India	-0.2149	-1.6627	-1.7976	-1.4360	-1.2962	9	-1.2778	9
Pakistan	-0.2836	-0.4255	-0.5556	-0.7227	-0.4415	8	-0.4969	8
Europe:								
France	-0.8283	1.0455	0.6916	0.6910	0.4294	3	0.3999	4
Germany	0.2443	0.5868	0.7809	0.7783	0.5342	2	0.5976	2
Norway	1.4190	0.7059	0.8894	0.8525	0.9587	1	0.9667	1
Sweden	-0.1106	0.3789	0.9296	0.9258	0.3826	5	0.5309	3
United Kingdom	-0.6242	1.0165	0.5046	0.4020	0.3971	4	0.3247	5
North America:								
Canada	-0.4178	0.3484	0.5997	0.5034	0.1761	6	0.2584	6
United States	-0.8877	-0.0395	-0.3088	0.0858	-0.3095	7	-0.2876	7

Chapter 6

Discussion and Conclusion

The main theme of this paper is to highlight how Economic Security as a sub-component of overall well-being in a society may be measured and how different methodological choices may affect the underlying results of our index. Research in this relatively new area of study is in its initial stages, and authors are now trying to explore what constitutes economic security and how it affects the economic decisions made by people. In Chapter 2, we covered how the concept of 'uncertainty about future hazards' is studied in two inter-related but independently evolved literatures - the 'Vulnerability' literature and the 'Economic Security' literature. The Vulnerability perspective is studied in the context of poor countries and it focuses only on that section of population that are at immediate risk of poverty whereas the Economic Security concept, usually studied in the context of rich nations, has a broader perspective and is concerned about anxieties experienced by all citizens, not only the poor. This paper takes the Economic Security perspective and attempts to study, in a comparable way, the anxieties experienced by people in poor and rich countries.

In Chapter 3, we further explore how Economic Security affects the overall well-being of individuals in a society. For most part of our recent history, especially after World War II, growth in per capita national output, or in other words per capita GDP, has been considered to be equivalent to increases in economic well-being. We have highlighted that economic well-being not only constitute market activities, which are well accounted for in GDP measure, but it also involves goods that are produced by non-market activity, for example, leisure, wealth, longevity to name a few. Furthermore GDP also does not account for economic inequality and insecurity experienced by individuals in a society. In this paper, however, we focus our attention only on the 'economic security' part of well-being.

In Chapter 4, we provide a theoretical framework to explain why economic agents

value economic security and why its absence may decrease their overall economic well-beings. In this chapter we also provided a discussion of human rights perspective which emphasizes on the anxieties of all citizens uninsurable economic hazards. Article 25 of the UN's Universal Declaration of Human Rights, formulated in 1948, provides a starting point and a logical basis as to how an Index of Economic Security might constructed.

Economic insecurity is driven by fears of uninsured hazards that are, ex ante, uncertain which is conceptually different from, however correlated with, current poverty and inequality. As noted by Osberg (2010) if a person is poor currently but knows his future real income with certainty, for example, a poor pensioner with inflation-indexed pension, then he is in essence not 'insecure'. His known future income is quite low but he is certain how much poverty he will face in future and therefore can plan accordingly. He is better off than a person who is both currently poor and anxious about losing the little that he may have now in the future.

Chapter 5 illustrated how an Index of Economic Security might be constructed for a sample of three South Asian and seven OECD countries. In rich countries, private capital and insurance markets are well developed and public social insurance is available to enable people mitigate the loss in the event of unemployment, sickness, loss of male earnings, disability and old age. However in poor countries, either these mechanisms may be completely absent or may be very constrained that risk mitigation by citizens through formal channels of private markets and public insurance may not be possible. However in poor countries, people usually have a rich network of informal private transfers and prefer to live in extended families that help them to overcome many of the hazards described above. However, research has shown that even these informal networks are imperfect and still some risks may not be completely insured which might leave individuals anxious about their economic future. In this paper, we have tried to develop a comparable index to measure these insecurities faced by people whether they reside in a rich or a poor country. Due to the absence of easily available statistics, especially in the case of the three South Asian countries, compromises were inescapable. This paper also serves as a motivation for the international data collection agencies, like ILO, FAO, WHO and World Bank, to attempt to streamline data collection procedures in order to ensure more comparable data for a wide set of

countries.

Further, we have focused on each component of Economic Security (Unemployment, Sickness, Widowhood, Old-age and Disability) separately, and aggregated them into a composite index. Two methodological choices are important in this Index construction – standardization and aggregation. We have explored two methods of standardization – Linear Scaling Technique (LST) and Z-score Normalization and highlighted how it affects county rankings. Also we have shown how two different methods of aggregation, namely Arithmetic Averaging (AA) and Power Averaging (PA) can affect ranking outcomes for the countries in our sample.

In Figure 6.1, we have highlighted how the different thought experiments (i.e. using different methodology) can affect the rankings of countries. Note that there are three though experiments using Linear Scaling Technique (LST): the first and second one aggregates the index using Arithmetic Averaging (AA) but with two different sets of weights i.e. Population Weights (PW) and Equal Weights (EQ), the third experiment uses Power Averaging (PA) to aggregate the index. The last two experiments use Z-Score Normalization for standardization and Arithmetic Averaging for aggregation, however with different weights. Note that we cannot use Power Averaging along with Z-score Normalization because, as mentioned before, it requires the underlying index to have a finite range which is not possible if we standardize using Z-score. The indices presented int his figure are for the year 2011.

Figure 6.1: Country Rankings with Different Methodological Choices
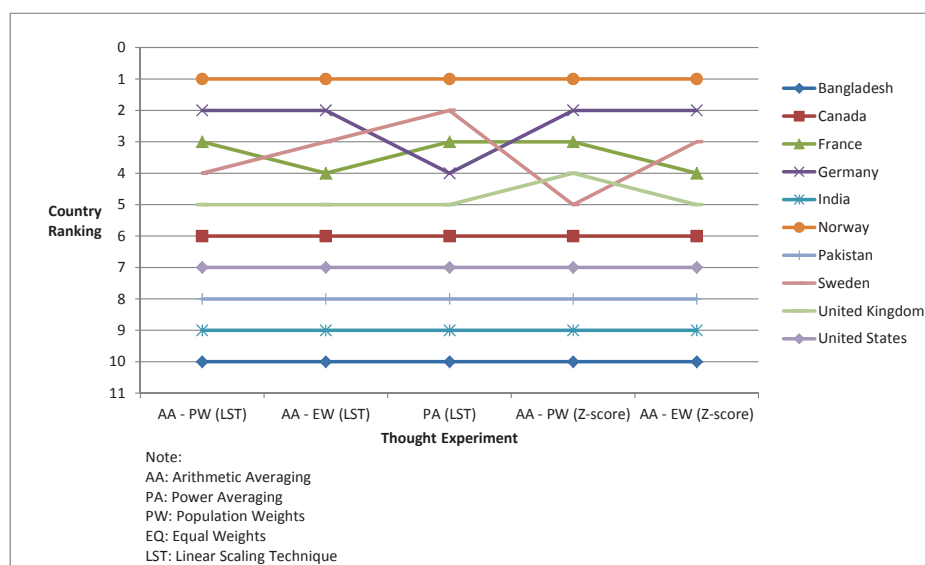
It is interesting to note that rankings of four out of ten countries in our sample are affected by changing the underlying methodology of index construction. The four countries are France, Germany, Sweden and United Kingdom. The reason might be because of the fact that these countries lie quite close to each other on the spectrum of well-being index and therefore their rankings are quite sensitive to changes in methodology. Norway is always ranked the highest whereas Bangladesh is always ranked the lowest. United States is ranked lowest among the OECD group of countries (i.e. seventh overall) whereas Pakistan and India ranked eighth and ninth respectively.

In Figure 6.2, we have used per capita GDP and HDI alongwith our Index of Economic Security (using arithmetic averaging with population weights and LST as standardization method) for the year 2011 to rank the countries.United States performs much better ranking second according to both HDI and per capita GDP. Canada jumps two ranks if GDP per capita is considered and one more rank if HDI is considered. France falls from Rank three to seven accorking to per capita GDP ranking but improves one ranking if HDI is considered. Also India performs better than Bangladesh and Pakistan, however ranking according to the Index of Economic Security puts Pakistan ahead of India and Bangladesh. We see that eight out of ten (Norway and Bangladesh remain same) country rankings change as the ranking

indices change which reiterates our earlier claim that an Index of Economic Security does provide useful insights into the economic well-being of individuals in a society and should not be ignored in the face of simple accounting measures such as GDP per capita.

Figure 6.2: Country Rankings According to Different Indices
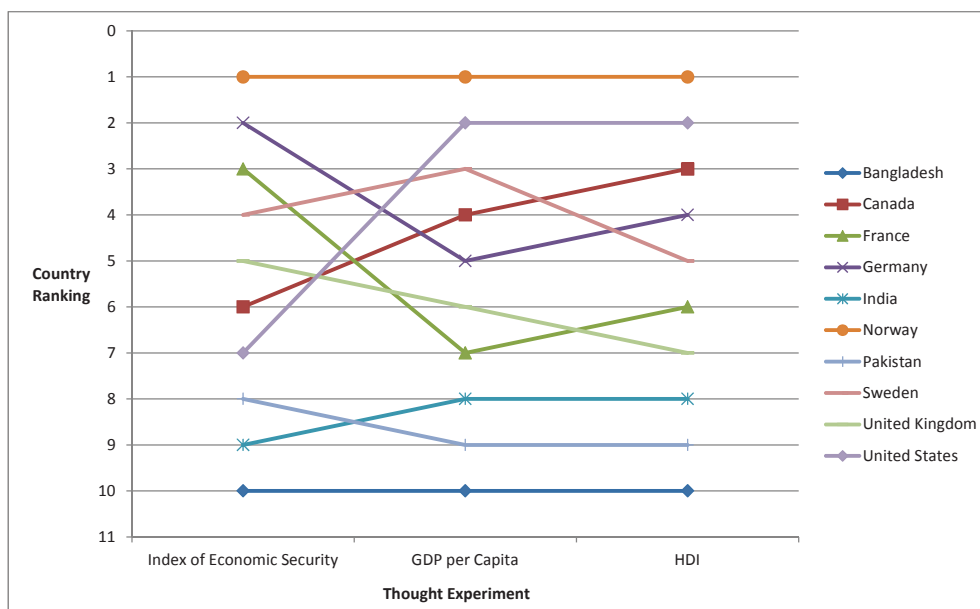
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Appendix A:

Population Weights and Index of Economic Security (Calculations, 2011)

	Bangladesh	Canada	France	Germany	India	Norway	Pakistan	Sweden	United Kingdom	United States
Working Age (15-64) as % of Total Population	63.70	68.00	61.80	65.80	64.80	66.30	60.20	65.40	64.40	64.30
Proportion of people at risk of falling sick	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Women and Kids at Risk of Widowhood	65.87	33.40	36.50	28.90	62.07	36.40	66.35	33.90	34.60	39.30
45-64 aged people at Risk of Old-Age	13.52	27.50	25.00	27.40	16.53	25.50	12.54	25.90	25.10	25.70
Sum	243.09	228.90	223.30	222.10	243.40	228.20	239.09	225.20	224.10	229.30
Proportionate Weights and respective indices										
Working Age Population*	0.2620	0.2971	0.2768	0.2963	0.2662	0.2905	0.2518	0.2904	0.2874	0.2804
Index of Livelihood Security	0.2370	0.3612	0.4826	0.5297	0.3573	0.8338	0.3601	0.6274	0.2892	0.3498
Sickness Weights	0.4114	0.4369	0.4478	0.4502	0.4108	0.4382	0.4183	0.4440	0.4462	0.4361
Index of Security from Cost of Illness	0.0833	0.7230	0.9167	0.7892	0.1643	0.8223	0.5080	0.7315	0.9086	0.6152
Married Women and their under 18/19 Kids	0.2710	0.1459	0.1635	0.1301	0.2550	0.1595	0.2775	0.1505	0.1544	0.1714
Index of Security from Widowhood	0.1047	0.8316	0.8602	0.8881	0.0849	0.9219	0.4718	0.9344	0.8020	0.5487
45-64 Population	0.0556	0.1201	0.1120	0.1234	0.0679	0.1117	0.0525	0.1150	0.1120	0.1121
Index of Security in Old Age	0.0843	0.8085	0.8611	0.8856	0.2648	0.9064	0.4648	0.9269	0.7801	0.6914
Index of Economic Security**	0.1295	0.6416	0.7811	0.7371	0.2023	0.8509	0.4585	0.7543	0.6998	0.5379
Country Rank	10	6	2	4	9	1	8	3	5	7

Source: Osberg & Sharpe's calculation from CSLS website: < http://www.csls.ca/iwb/oecd.asp> for OECD countries; and Author's calculation for Bangladesh, India and Pakistan
*Proportionate weights calculated as per fraction of total: e.g. For Bangladesh, total sum of weights= 243.09, so proportionate weight for working age = 63.7/243.09 = 0.262
**Index = sum of the products of sub-indices and their respect weights: e.g. For Bangladesh 0.1295 = 0.262*0.237 + 0.4114*0.0833 + 0.271*0.1047 + 0.0556*0.0843

Appendix B: Electronic Data File

An electronic excel data file is available in Dalspace which summarizes all the calculations used in this paper. The file is provided for convenience of reader. The file has its own Table of Contents and contains calculations and data sources used in Tables and Figures. For further information please contact the author at this email address: sy250392@dal.ca