International Trade and its Impact on Poverty in India since 1991

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DECLARATION

I declare that the thesis entitled "**International Trade and its Impact on Poverty in India since 1991**" submitted by me for the award of the degree of **Doctor of Philosophy** of Jawaharlal Nehru University is my own work. The thesis has not been submitted for any other degree of this University or any other university.

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Certificate

We recommend that this thesis be placed before the examiners for evaluation.

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Abbreviations

2SLS	Two Stage Least Squares
ASI	Annual Survey of Industries
CDS	Current Daily Status
CGE	Computable General Equilibrium
CMIE	Centre for Monitoring the Indian Economy
CPI-AL	Consumer Price Index of Agricultural Labourers
CPI-IW	Consumer Price Index of Industrial Workers
CSO	Central Statistical Organization
CWS	Current Weekly Status
DGCI&S	Directorate General of Commercial Intelligence & Statistics
DTR	Daily Trade Return
EPWRF	Economic and Political Weekly Research Foundation
ERP	Effective Rate of Protection
EXIM	Export - Import
FDI	Foreign Direct Investment
FE	Fixed Effects
FE2SLS	Fixed Effects 2SLS
FGT	Foster Greer Thorbecke
GDP	Gross Domestic Product
GE	Generalised Entropy
GLS	Generalized Least Squares
GMM	Generalised Methods of Moments
GSDP	Gross State Domestic Product
HCR	Head Count Ratio
HH	Hirschman-Herfindahl
HO	Hecksher-Ohlin
HOV	Heckscher-Ohlin-Vanek
ICA	Investment Climate Assessment
ICR	Import Coverage Ratio
IDA	Industrial Disputes Act
IMF	International Monetary Fund
IRDA	Insurance Regulatory & Development Authority
ISIC	International Standard Industrial Classification
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MOSPI	Ministry of Statistics and Programme Implementation
MPCE	Monthly Per Capita Consumer Expenditure
MRP	Mixed Recall Period
MRW	Mankiw, Romer and Weil

NIC	National Industrial Classification
NSDP	Net State Domestic Product
NSSO	National Sample Survey Office
NTB	Non-Tariffs Barrier
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PGI	Poverty – Growth – Inequality
PGI	Poverty Gap Index
POL	Petroleum, Oil and Lubricants
PPP	Purchasing Power Parity
RBI	Reserve Bank of India
RE	Random Effects
RE2SLS	Random Effects 2SLS
RHS	Right-Hand Side
RMSE %	Root Mean Squared Percent Error
SBTC	Skill Biased Technological Change
SC	Scheduled Caste
SEM	Simultaneous Equation Model
SPGI	Squared Poverty Gap Index
SS	Stolper-Samuelson
ST	Scehduled Tribe
UAE	United Arab Emirates
UNCOMTRADE	United Nations Commodity Trade Statistics
UNCTAD	United Nations Commission for Trade and Development
URP	Uniform Recall Period
US	United States
WITS	World Integrated Trade Solutions
WTO	World Trade Organization

Chapter I
Introduction

1.1 Background

The process of globalization and its concomitant effects on the global poverty and inequality have been important areas of concern for the policy makers and researchers alike. According to World Bank, more than a billion people lived in extreme poverty (less than $1.25 a day) in the year 2011, hence reducing world poverty is a moral imperative. Though, World Bank projected a fall in global poverty from 902 to 702 million people in the period of 2012 to 2015 (according to the revised poverty line defining the extreme poverty at $1.90 a day), still these numbers remain unacceptably high. Poverty reduction objective has thus, been a central focus of global development policy. Under the "Millennium Development Goals", the first goal was to 'eradicate extreme poverty and hunger', targeting to reduce extreme poverty by half between 1990 and 2015. Under the "Sustainable Development Goals" adopted in 2015, the aim now is to end extreme poverty by 2030.

The economies today are unarguably global in nature. In the last half decade, the world trade as a proportion of world gross domestic product (GDP) approximately doubled (World Bank Group and World Trade Organization, 2015). This is also the period when the incidence of poverty substantially reduced. Although, the poverty incidence was declining over the last two decades, there is relatively less clarity on the trend of the absolute number of poor (Harrison, 2006). The number of people living below the poverty line of $1 a day have decreased slightly but the number living on less than $2 a day have been increasing gradually. Simultaneously, in the past three decades, the world is also experiencing a rise in both across and within-country inequality. This trend of rising inequality, observed in all forms - whether measured as income inequality, wage inequality or assets inequality - is present in both the developed and developing countries (Nayyar, 2013).

Poverty and inequality have always been important issues for developing countries, mainly because of their large vulnerable populations. Over the last few decades, there is evidence of robust decline in absolute income poverty, but the inequality is rising and on average the developing countries are more unequal today than a few decades earlier (Alvaredo & Gasparini, 2015). The developing countries have also become integrated into the world trading system in the last two decades. In

fact, developing countries are now more globalized, as they have higher share of exports in GDP than high income countries. The developed and developing countries are increasing trading with each other and many developing countries are also experiencing high income growth rates. Does this process of globalization, especially liberalization of trade, reduce poverty? The World Bank has regarded globalisation as an important tool to fight world poverty and inequality (World Bank 2002). Thus, there is a high level of policy interest in the issue of the effect of globalization and trade liberalization on poverty and inequality, especially for developing-countries (Winters et al., 2004, Goldberg & Pavnick, 2007).

How trade liberalization affect poverty and inequality is still under researched, particularly for less developed and developing countries. A large pool of studies such as Dollar (2001), Dollar & Kraay (2002), Winters et.al. (2004), Goldberg & Pavcnik (2007) focus on cross county analysis of national level poverty and trade flows. However, the effects of international trade on economic development differ across developed and developing countries and also within them. There are various institutional and other economic differences across countries that affect this relationship. Thus, it is recognized that country specific studies are to be preferred over cross country studies for an in-depth analysis of these effects (Harrison, 2006; Rodriguez & Rodrik, 1999).

1.2 Motivation for the Study

India followed liberalization process as a consequence of balance of payments and fiscal crisis of 1991. The trade liberalization reforms reduced tariffs and non-tariff barriers and the gradual reduction of control over exchange rate. The effective rate of protection (ERP) dropped in 1996-97 to 55 percent from a high figure of 166 percent in 1988-89 and further to 20 percent in 2009-10. The non-tariff protection measures experienced a significant decline in post-1980 period. After India's export-import (EXIM) Policy for 1999-00, only 2134 products were subject to NTBs and in the EXIM Policy of 2001, the quantitative restrictions from all goods were removed (Das, 2016).

In the post reform period, India experienced a significant increase in trade volumes. The trade to GDP ratio rose from 15 percent in 1980s to 31 percent by the year 2000. The merchandise trade to GDP ratio increased sharply between 2004-05 and 2013-14 (from 28.2 percent to 42 percent). The share in world exports increased from

0.7 to 1.7 percent and in world imports from 0.8 to 2.5 percent, during the period of 2000 to 2013 (Economic Survey, 2015).

India's comparative advantage lie in production of goods and services that are labour-intensive and hence, trade liberalization was expected to benefit the poor. Thus, there was strong hope from the economic reforms to bring about rapid growth and poverty reduction. The GDP per capita grew annually at an average growth of 4.5 percent in the post reform years of 1993-94 to 2004-05, up from 3 percent in 1983 to 1993-94, which further increased to 6 percent from 2004-05 to 2014-15.

There is also no denying the fact that poverty has declined steadily in India since 1990s. According to estimates of the Planning Commission, incidence and depth of poverty have fallen more strongly after 1990s. Poverty ratio fell from 45.3 in 1993-94 to 21.9 in 2011-12. The decline was observed in both rural and urban sectors of the economy. The rural and urban poverty ratios reduced to 26 and 14 respectively, from the earlier figures of 50 and 32. However, the fall in poverty incidence is relatively slower in India, when compared to other Asian countries like China, Indonesia, and Viet Nam (Hasan et.al. 2013). The trends in inequality in India are not so encouraging. Both rural and urban inequality has been increasing since 1993-94, with urban inequality increasing at a higher rate (Radhakrishna, 2015). For the period of 1993-94 to 2011-12, the Gini coefficient for urban areas increased from 0.32 to 0.37 and for the rural areas from 0.26 to 0.28. The inequality between rural and urban sectors deteriorated over time, except in the last period of 2011-12 (as urban inequality decreased marginally).

Thus, the increase in growth of trade proportions and income in India, were accompanied by significant changes in poverty and inequality in rural and urban sectors. Around 30 percent of poor population of the world are located in India, therefore, it becomes imperative to enquire and analyse the role played by the trade liberalization and accompanied growth in trade volumes, in the observed reduction of poverty. The present study, thus focusses on analysing the impact of trade liberalization on poverty and inequality in India.

1.3 Objectives of the Study

There are no direct and immediate linkages between trade liberalization and poverty (Winters, 2000a). The relationship operates via different channels, classified as static (further categorized into households, distribution, factor markets and

government) and dynamic (via growth and inequality) impacts of trade openness on poverty. The theoretical and empirical literature pertaining to these different effects establishes that the dynamic and static effects of trade openness on poverty are ambiguous. It is recognized that the issue is largely empirical in nature and country's domestic factors and macroeconomic scenario play a very important role in determining this relationship (Winters et.al., 2004). The empirical literature has largely concentrated on the static effects of trade liberalization on poverty (and inequality), and not on the indirect dynamic effect of trade liberalization on growth, and hence on poverty and inequality (Alvaredo & Gasparini, 2015).

The present study attempts to look at both the dynamic and static effects of trade liberalization on poverty in India. Hence, first the most important effect (dynamic) of trade openness on growth, inequality and poverty is analysed. This study further analyses the effect of trade openness on factor markets (static) by looking at labour market and hence, the impact on unemployment rate and wage inequality. These are two strong correlates of poverty and are two important channels of impact of trade liberalization. The study attempts to address the following three relevant objectives, with reference to India:

(1) Whether trade openness affects per capita income and income distribution, leading to poverty reduction.

(2) Whether trade openness through the impact on labour market reduces unemployment, thereby helping to reduce poverty.

(3) Whether trade openness through the impact on labour market reduces wage inequality, thereby help reducing poverty.

The dynamic argument is in the context of economic growth achieved through liberalisation of trade. It is also recognised that economic growth is crucial for poverty alleviation. There is a vast theoretical literature on the relation between trade openness and growth since 1940s, when trade was characterized as "engine of growth". The Harrod – Domar model was used extensively in the 1950s. Between 1960s and 70s the dominant approach to the analysis of growth was the Solow neoclassical model of economic growth; modified as 'augmented' Solow Model by Mankiw et.al. (1992). Endogenous growth theories later emerged to a great extent from the contributions of Romer (1986) and Lucas (1988) in the 1980s.

The second causal relation from income growth to poverty reduction is fairly well established, at both theoretical and empirical grounds, by various authors such as

Ravallion (2004), Dollar & Kraay (2002), Ravallion & Chen (1997) etc. Unless income growth leads to vast worsening of income distribution, average incomes will increase and the absolute poverty will decline.

The second objective concerns an important channel for poverty reduction as the effect of trade openness. When a developing country like India, opens to international trade and exports more labour-intensive goods, it increases the labour demand. Since poverty is usually concerted in population either potential to join or at the lower end of the labour force, the increase in labour demand is expected to help alleviate poverty.

The relationship between trade openness and labour markets has been historically studied using the Hecksher-Ohlin (HO) and Stolper-Samuelson (SS) theorems. Most of the trade models assume full employment of labour and all factors at all times and hence, do not recognise any impact of trade on employment. The four theories of employment have been incorporated in the traditional models (HO and Ricardo-Viner) with labour frictions of various kinds: minimum wage theory (Brecher, 1974 and Davis, 1998), implicit contract theory (Matusz, 1986), efficiency wage theory (Matusz, 1996) and job search theory (Davidson, Martin & Matusz, 1999 and Moore & Ranjan, 2005). The recent theoretical developments introduced two new types of trade models - heterogeneity of firms (Helpman & Itskhoki, 2010; Helpman, Itskhoki & Redding, 2010; Egger & Kreickemeier, 2009) and offshoring or trade in tasks (Batra & Beladi, 2010; Mitra & Ranjan, 2010; Ranjan (2012 & 2013).

The third objective also is important because how trade openness affects wage inequality of a country determines its impact on poverty. The lower wage earners are more probable of being poor or falling in poverty, as compared to higher wage earners (Goldberg & Pavcnik, 2004).

The trade theories (HO and SS) predict that openness would push up the relative demand for unskilled labour and their wages, thus reducing the wage inequality in unskilled labour abundant developing countries and increasing it in skilled labour abundant developed countries. However, the inequality (especially within-country inequality) in both developed and developing countries experienced an increasing trend over the past two to three decades (Harrison et al., 2010). Various attempts have been made to explain this trend by developments in the theoretical literature.

The traditional theories were reformulated and expanded in scope, to account for the changes in the pattern of trade of developing countries, by authors such as Jones

(1971), Katz et.al. (1989), Davis (1996) and Feenstra & Hanson (1996). There was also an attempt to explain this trend by looking at factors other than trade, such as skill biased technological change (SBTC), capital flows etc., by Krugman (2000), Robbins (1996), Wood (1995) and Acemoglu (2003). The recent contributions of Melitz (2003), Amiti & Davis (2011), Verhoogen (2008) and Helpman et.al. (2010), included within industry factors (heterogeneous firms, effects of labour market frictions and incomplete contracts) in their models of international trade.

1.4 Methodology and Scope of the Study

The three objectives are empirically analysed using panel data for 21 major states of India (including Delhi)[1] for the period of post trade liberalization reforms of 1990s. The data for three important variables – poverty incidence, unemployment rate and wage inequality – is taken from the household surveys undertaken by the National Sample Survey Office (NSSO). The NSSO carries out large sample surveys of Consumer Expenditure and Employment & Unemployment for all-India usually once in five years.

The Household Consumer Expenditure Surveys are the primary source of consumption and well-being data at the national and state levels. These surveys provide the estimates of household monthly per capita consumption expenditure (MPCE), which is used to calculate poverty and inequality for the country; states and their rural and urban sectors. Similarly, the Employment and Unemployment surveys are the principal source of labour force indicators (employment and unemployment characteristics). For post liberalization period, the data is available for five quinquennial thick survey rounds for the years 1993-94, 1999-2000, 2004-05, 2009-10 and 2011-12.

To empirically analyse the three objectives of the study, a pre requisite is to obtain a measure of state level trade openness, as data for trade openness at sub national level is not available for India. The trade openness can be measured by either using the volume of trade i.e. outcome measures or reduction in tariffs and non-tariff barriers i.e. policy measures. Few measures for estimating trade openness for the states or districts are accessible in the literature such as; tariffs and non-tariff measures estimated by Topalova (2005) and Hasan et.al. (2007); state level export orientation by United Nations Commission for Trade and Development (UNCTAD), 2013; Economic

[1] The states included in the study are listed in Appendix 1.1.

Survey data on state level exports; State openness index by Marjit & Kar (2008); and estimation of state wise trade data by Barua & Chakraborty (2010). These measures are either not the estimates of the nominal value of both exports and imports at the state level or are not available for the period under study (1993-94 to 2011-12). Thus, the study attempts to refine and modify the measures present and constructs a state level measure of trade openness. It incorporates outcome measures of trade openness, as these are ex post measures and enables to evaluate the economy's real exposure to international trade. The exports and imports (in nominal terms) are estimated for states. These estimated figures are added to calculate the percentage share of total trade balance in net state domestic product (NSDP) and is used as a measure of trade openness.

The available empirical literature concentrating on the first objective, largely tests for either the effect of trade liberalization on economic growth (assuming this would lead to poverty reduction) or the effect of growth on poverty (assuming that growth has occurred due to liberalization of trade). It is also challenging to reach a definitive conclusion about the impact of trade liberalization on income growth. The studies such as Dollar (2001); Sachs & Warner (1995); Edwards (1998) Rajan (2002); Ravallion (2004); Rodriguez & Rodrik (1999), have found mixed results. In contrast, there is agreement on the positive impact of income growth on poverty by Dollar & Kraay (2002), Ravallion & Chen (1997). There are very few studies which have analysed these relations jointly.

According to Bourguignon (2003), growth and income distribution have to be studied simultaneously for analyzing poverty reduction, depicted by the poverty – growth – inequality (PGI) triangle. Whether growth leads to reduction or increase in inequality and whether high inequality helps promote or hinders growth, would determine the poverty reduction of a country. This reverse causality is present not only between growth-inequality relationship but also between trade openness and growth (Rodriguez & Rodrik, 1999). The single equation analysis would suffer from the limitation of not taking into account the endogeneity of these variables. The solution lies in treating them as endogenous variables and to estimate the equations jointly. Thus, to account for these inter relations, the approach followed is to superimpose trade openness on the PGI triangle, and adoption of a simultaneous equations model of four structural equations for trade openness, per capita net state domestic product (PCNSDP), poverty and inequality. The model is estimated using both panel data

Ordinary Least Squares (OLS) and Two Stage Least Squares (2SLS) methodologies. The estimation results are further validated and checked for robustness.

For analysing the second objective of the relationship between trade liberalization and unemployment, different approaches have been undertaken by Felbermayr et.al. (2011b), Blanchard & Wolfers (2000), Nickell et al. (2005), Sener (2001), Moore & Ranjan (2005), Hasan et.al. (2012) and Goldar (2009). The overall evidence as to whether trade liberalization leads to fall in unemployment is found to be ambiguous. But some general conclusions emerge: One, country specific effects are important and hence, country case studies are more relevant in this area. Second, the differences in labour market institutions explain divergence of results for various countries. Third, the exclusive focus on manufacturing employment (leaving out agriculture and services sectors) is an important shortcoming of the existing studies

The present study empirically analyses the relationship between trade and aggregate unemployment on the data for states (separately for rural and urban areas). The panel regression is estimated using Fixed Effects (FE) and Random Effects (RE) specifications and two tests of Hausman specification test and Mundlak formulation are conducted to choose between the two. It also takes into account labour market institutions of states in the empirical analysis by taking state level labour reforms index given in OECD (2007). The analysis reveals unequal effects of trade openness on unemployment in the states; and by not focussing exclusively on the manufacturing sector (which represents a minor population proportion), it captures the impact of trade openness on aggregate unemployment of the states.

Most of the empirical studies analysing the third objective, have found trade liberalization to be associated with higher wage inequality and other broader measures of inequality, contradicting the theory (Goldberg & Pavcnik, 2004 & 2007). The studies largely focus on the effect of trade liberalization on narrow definition of wage inequality, measured as reduction in industry wage premia and increase in skill premium. These however, suffer from the limitation of concentrating on only the formal workers in the manufacturing urban sector.

This study tests the hypothesis that trade liberalization leads to decrease in wage inequality by using panel regression framework. The analysis covers the entire economy (agriculture, organised and unorganised manufacturing and services) by looking at wage inequality in rural and urban sectors of the states. The Gini coefficient of real wages (comprising of wages earned by casual and regular labour employed) is

used as a measure of wage inequality. However, total income of the workers and also wages of the self-employed workers are excluded. This is so because the data for income inequality is not available for the Indian economy and the income of the self-employed workers is mixed income and cannot be differentiated separately as wages. The presence of flexible labour market institutions is important for positive effect of trade liberalization on wage inequality. Hence, status of labour market institutions of different states, defined as state level labour reforms index in OECD (2007) is also included.

1.5 The Chapter Scheme

The study is divided into seven chapters.

This first chapter introduces the topic and provides the background, motivation and objectives of the study. It also briefly provides the methodology and main findings of the study.

Chapter 2 reviews the theoretical and empirical contributions in the literature pertaining to the impact of trade liberalization on poverty, characterized as static and dynamic effects.

Chapter 3 discusses the background of trade liberalization in India; various reforms adopted; and trends in growth, composition and direction of trade in India since 1991. The chapter also provides the details of the calculation of the state level measure of trade openness. The chapter further details and debates various issues regarding the concept of poverty in India and its measurement; discusses the extent and trends of poverty and inequality observed in India since 1991.

Chapters 4, 5 and 6 empirically analyse the objectives of the study. These chapters also review the relevant empirical studies for the Indian economy.

Chapter 4 analyses the dynamic effect of trade on poverty via the channel of the impact on growth. The two way causal relations of trade impacting income and income impacting poverty and inequality are modelled as simultaneous equations of these four variables – Trade Openness, Per Capita Income, Poverty, and Inequality, and analysed using panel data for states of India.

Chapters 5 and 6 focus on the static channel through labour markets. Chapter 5 tests the hypothesis that trade liberalization leads to decrease in unemployment of the states, distinctly for the rural and urban sectors.

Chapter 6 takes the analysis of labour market further by testing the third hypothesis that trade liberalization leads to decrease in wage inequality for states in India, again distinctly for the rural and urban sectors.

Chapter 7 summarises and presents the main findings of the study. The contributions and limitations of the study along with directions of future research are also discussed in this chapter.

1.6 Main Findings of the Study

The econometric results of the first objective show that the per capita income of states negatively affects the poverty rate. Trade openness and PCNSDP are found to be positively impacting each other. However, PCNSDP and inequality are not found to be impacting each other and trade openness is also not significantly impacting the inequality. From the presence of the significant relations (between the four endogenous variables of the model), we can conclude that trade openness leads to poverty reduction, through its positive impact on per capita income. The trade elasticity of poverty is estimated to be -1.7 (by taking only significant regression coefficients). Thus, trade openness is expected to play a significant role in poverty reduction.

The other exogenous variables found to be directly leading to poverty reduction are proportion of working population, proportion of graduates and above in population and per capita government expenditure. These factors are important to concentrate on to achieve the objective of poverty reduction in India, as they positively impact PCNSDP and help in poverty reduction through this indirect link as well.

The results of the relation between trade openness and unemployment conform to the Ricardian model that trade openness leads to fall in unemployment. The elasticity is found to be -1.52. This negative relationship is also found to be higher and stronger for more flexible states and for rural parts of the states than their urban counterparts, implying that the rural sector is dominant in driving the results. Proportion of working population is found to be negatively and dummy variable for high growth phase is found to be positively impacting the unemployment rate of the states and their rural areas, but not found to be significant for their urban areas.

The empirical results on the effect of trade openness on wage inequality does not support the HO and SS model of trade and indicates that trade openness does not lead to decrease in the wage inequality. The urban wage inequality is found to be significantly and positively impacted (coefficient value of 0.12) by the trade openness.

The wage inequality in the rural sector and the state as a whole, however, is not found to be significantly impacted by the trade openness. The presence of more flexible labour market institutions in the states is also found to have no effect on these results. The other important determinants are, PCNSDP and literacy rate found to be reducing whereas higher education levels and high growth phase of the economy found to be increasing, the wage inequality.

Chapter 2

Literature Review: Aspects of Trade, Poverty and Inequality

2.1 Background

There is a high level of interest in analysing the effect of trade on poverty and inequality, over the last several years (Winters et al., 2004, Goldberg & Pavnick 2007). There are various studies on the subject and they vary across many dimensions. The studies can be classified based on the methodology followed i.e partial- or general-equilibrium approach; the scope of the analysis i.e. single or cross-country analysis or whether the micro simulation is carried on and the analysis is based on representative households or actual households, and so forth.

This chapter follows the approach of Winters (2000a) in classifying studies for the literature review. According to Winters (2000a), the impact of trade on poverty can be studied as static effects via broad channels of households, distribution, factor markets and government or as dynamic effects via the channel of growth. Theoretically, outward-oriented policies are likely to exert a positive impact on economic growth and development in the economies. But it has been argued strongly by Winters et.al. (2004) that whether trade liberalisation reduced or increased poverty remains an empirical question.

This chapter, hence first discusses the theoretical impact of trade on poverty, dividing it into two categories of static effects and dynamic effects in section 2.2 and 2.3 respectively. These sections also provide in detail the theoretical advancements in the literature pertaining to two channels of factor / labour markets (i.e. unemployment and wage inequality) and growth, which are main concerns of the present study. Sections 2.4 to 2.7 provide the review of empirical studies looking at trade's impact on poverty via different channels. Section 2.4 discusses the studies related to long run dynamic relation of trade on poverty through growth; section 2.5 and 2.6 concentrate on review of empirical studies related to the indirect channel of factor markets with section 2.5 focussing on unemployment and section 2.6 on wage inequality; section 2.7 reviews the studies analysing the relationship through other factors, more importantly price changes. Section 2.8 concludes. The studies specific to the Indian economy are reviewed and presented in the respective chapters empirically analysing the channels of trade – poverty linkages, namely chapters 4, 5 and 6.

2.2 Static Effects of Trade and Poverty Relationship

There are broadly two strands of literature studying the impact of trade on poverty: static and dynamic (Bhagwati & Srinivasan, 2002). Static effects arise, at a given point of time, because of reallocation of resources and profits. It is assumed that due to liberalization of trade, resources would reallocate towards the sectors of comparative advantage within a country. The main tool of analysis is 'household' that produces; sells its labour and consumes. The increase (decrease) in price of labour, goods or services that the household sells or decrease (increase) in the price of goods or services that the household consumes, increases (decreases) the real income of the household. Trade reforms also impact various aspects of factor markets of which employment and wages are the most important, from the point of view of poverty. Finally, they can also affect government revenue. The static effects of trade on poverty, hence, can be studied through four institutional groups: households; distribution channels; factor markets and government (Winters, 2000a; Winters, McCulloch & McKay, 2004), which also lead to analytical questions for the empirical analysis.

2.2.1 Households

The welfare of the household is determined by its income and prices of all goods and services that are consumed. The effect of trade liberalization is passed on through the price changes of the commodities bought and sold. Thus, it implies analysing the effect of trade reforms on the changes in prices of the consumption and production goods of the households.

Certain sections of the households would not get directly affected by trade but indirectly from increase in demand from the households who had directly benefitted from trade. Thus, both production and expenditure linkages might be operating. It would be useful to analyse which sector generates largest backward and forward linkages and hence would benefit the economy at large. The effectiveness of linkages also depends upon the responses of the local businesses to the increased demand. If there are rigidities in institutions then this will only lead to higher inflation. The overall impact on growth and hence on poverty will be smaller in that case.

It is also repeatedly argued that trade liberalization affects the vulnerability of poor population to external shocks and hence the risks faced by them. Vulnerability is an important concern. This makes poor less prepared to insure themselves against the adverse impacts of trade liberalization. These factors above lead to the analytical

questions like: Whether price changes originating due to trade get transferred to poor households and in what form?; Whether these spillovers or indirect effects benefit the poor?; Whether trade liberalization lead to more vulnerability in the poor households?

2.2.2 Distribution Channels

The study of channels of distribution and the response of agents and institutions are important to analyse the impacts of price shocks due to trade liberalization on poor households. Hence, the question is how the households respond to these impacts, whether and to what extent they are able to safeguard themselves against negative effects or take advantage of the positive effects of the reforms. If the households are not able to shift their activities, in response to reforms, it would leave them worse off. However, households can gain substantially if they can shift their activities to take the advantages of trade reforms.

Another important factor to be considered is whether trade reforms create or destroy markets. Trade can lead to creation of new markets through wider variety of available goods and creation of new opportunities for production. At the same time, markets can be destroyed through imports substituting the locally produced goods. In that case, households can suffer significant loss of income (Winters, 2000b). The policy intervention thus, takes on an important role for poverty alleviation by pushing for creation of markets that are more viable for poorer sections of the population.

The analytical issues emerging from above are regarding the nature of response of the households to trade liberalization and whether markets are created or destroyed due to trade liberalization.

2.2.3 Factor Markets

The relationship between trade liberalization and factor markets was historically studied using the HO and SS theorems. The HO theorem, predicts that countries export goods produced with the intensive use of the factors which are in abundant supply. Thus, developing countries would export more labour intensive goods, thereby increasing the demand for labour. This increase in demand would help to alleviate poverty, as poverty is concerted among people who are potentially part of the labour market or lie at its lower end. But an important determinant is how the labour market operates.

An important implication of the HO theorem is that trade increases the relative return to the abundant factor in each country, which is known as the SS Theorem. Thus,

trade openness would lead to an increase in the relative return to labour in the developing countries, as they are relatively labour abundant, and hence fall in their income inequality. The opposite is expected to hold for the developed countries, as capital is their relatively abundant factor. Thus, trade reforms are expected to help to alleviate poverty, by either increasing employment, or increasing wages, or both.

The theorem above does not suffice to fully understand the link between trade and poverty across countries. One important condition is the mobility of labour to ensure that unskilled labour move from the contracting sectors to the growing sectors. But in the real world, labour mobility can be restricted due to various obstacles on their movement or barriers on firms to entry and exit the markets (Topalova, 2005). Hence, the impact on poverty reduction is ambiguous.

The other assumption of the theorem is full employment of factors. But, if the factor supply is fully elastic, wages would not increase in response to its increasing demand. For alleviation of poverty it is required that the fall in availability of labour for the subsistence agriculture sector, increases their wages, which would also lead to increases in wages in the formal sector. So, the workers of both the subsistence sector and formal sector would gain from the increased wages, which helps alleviate poverty (Lewis, 1954).

Even if it is assumed that trade liberalization positively affects the unskilled labour in the long run, there would be a transition phase of temporary unemployment. In the short run there is going to be an adjustment mechanism in terms of finding new employment as workers would shift from one job to another. One needs to analyse whether the extent and incidence of this transitional unemployment falls more or less on the poorer sections of the households.

Thus the key analytical issue to be considered is whether trade liberalization leads to rise in wages and / or employment. The second relevant question is whether transitional unemployment is concentrated in poor households?

2.2.3.1 Review of Theoretical Literature on Trade Liberalization and Employment

Most of the trade models do not recognise any impact of trade on employment as they assume full employment of labour and all factors at all times. The early literature relied largely on two basic models of international trade, the HO model and Ricardo-Viner model. Later, the new trade theories emerged that took into account heterogeneity of firms, labour and offshoring. There is now a vast literature on the relationship

between trade and unemployment. Davidson & Matusz (2004) provide an excellent survey of literature.

The review of theoretical literature demonstrate a complex and ambiguous relationship between trade and aggregate employment. There are four theories of employment that have been incorporated in the traditional models (HO and Ricardian models) with labour frictions of various kinds to analyse the employment effects of trade liberalization: minimum wage theory, implicit contract theory, efficiency wage theory and job search theory.

Minimum wage theory predicts that as the minimum wage constraint is binding, the unemployment will increase. This was incorporated into HO model by Brecher (1974) and Davis (1998) and they found that trade liberalization will generate increase in unemployment.

The implicit contract theory implies that depending on the attitude towards risk, unemployment can fluctuate. Unemployment is determined by the implicit contract between the workers that are risk averse and firms that are risk neutral. Workers hence, prefer to smooth their income. In that case, the random shocks to the economy do not get absorbed by the wages and hence, unemployment adjusts in the wake of these random shocks. Matusz (1986) applied this theory with international trade and argued that unemployment depended not only on productivity and price but also on the employees' attitude towards risk or the marginal risk premium at the full employment level. If marginal risk premium is positive, wage during adverse state would be higher than equilibrium wage and as a result unemployment would exist in "bad" state. Thus employment in bad state is less than that in good state.

Another well-known theory of unemployment is the efficiency wage model. Firms would fire employees caught shirking their work but the perfect monitoring is very costly. Thus wages are set by firms above the market clearing wage, to induce workers against shirking of work. Due to this higher opportunity cost of shirking, unemployment would decline. Using this efficiency-wage framework, the impact of trade openness on the unemployment rate had been studied by Matusz (1996). The model predicted that opening to trade would create intra-industry trade and would increase the number of firms in that sector. This raises the no-shirking wage levels in the economy. Employees face a threat of losing their job in case they are caught shirking and the penalty is increasing not only in terms of wage but also lengthier spell of unemployment. Hence, workers would put more efforts into work and the employment

level also increases as lesser people would be shirking their work. Thus according to this model, trade openness would create intra-industry trade, leading to increase in wage and reduction in the unemployment rate.

Job search models of unemployment are an important branch of the literature. In these models, wages are determined through a bargaining process. Workers who are displaced search for new employment matches and are unemployed when they search. At equilibrium, frictional unemployment is present due to imperfect information in labour markets. Davidson, Martin & Matusz (1999) introduced equilibrium job search in international trade models. Their model showed that search frictions in the labour markets can affect both job creation and destruction. The reallocation of resources between sectors arise due to trade openness and would affect the aggregate unemployment rate of the country. If trade leads to costs reduction, there is an increase in labour demand in the export industry. But the aggregate unemployment rate increase (or decrease) would depend on whether the exports sectors' unemployment rate is higher (or lower) than the import-competing sectors'. This model is extended by Moore & Ranjan (2005) to include workers with differing skill intensity and found the results similar to above. Trade openness increases the unemployment rate in one and decreases it in the other sector, such that the effect on aggregate unemployment rate depends on the relative size of two sectors and is ambiguous.

Dutt, Mitra & Ranjan (2009) introduced search models in the traditional Ricardian structure and HO models and predicted that trade liberalization will reduce unemployment in the Ricardian model, whereas in the HO structure this will happen only if the country is labour abundant. The other studies introducing search models have presented contrasting results, as Felbermayr, Prat & Schmerer (2011a) found that unemployment reduces when the country opens up to trade.

The efficiency wage models only involve intra sector labour adjustment. Contrary to it, job search models predict the impact on inter sector labour adjustment. The change in unemployment rate after trade openness is the net effect of this intra sector and inter sector change of trade openness along with accounting for cyclical unemployment accompanying the expansionary and recessionary phases of the economy.

The recent development in trade theory challenged the traditional theories by introducing heterogeneity of firms and offshoring or trade in tasks. This new theoretical literature in trade adopted the above mentioned unemployment models to study the

employment effects of trade liberalization. This include, Helpman & Itskhoki (2010), Helpman, Itskhoki & Redding (2010), Egger & Kreickemeier (2009), Mitra & Ranjan (2010), Ranjan (2012 & 2013), Egger, Kreickemeier & Wrona (2015) and others.

Helpman & Itskhoki (2010) built a two-sector, two-country model of labour market friction in an open economy accounting for firm heterogeneity. Each country has two sectors each producing homogenous and differentiated goods. One sector has relatively more labour market frictions than the other. Trade liberalization policies would expand the share of the exporting sector as it improves the profitability of exporting firms. In response, workers would reallocate towards this sector. If this sector is characterized by relatively larger labour market frictions and there is no unemployment (due to the absence of search frictions in the labour market) in the other sector, aggregate unemployment would increase in the country. Janiak (2006) also got the similar results. To extend this model, Helpman, Itskhoki, & Redding (2010) added job-specific differences in the ability of workers. In their model, as firms try to screen out workers with low ability, trade affects both within-industry unemployment and wage inequality. Egger & Kreickemeier (2009) also took increasing returns to scale along with firm heterogeneity and incorporated fair wages to predict unemployment increases with trade liberalization.

Batra & Beladi (2010) incorporated the concept of offshoring in the standard HO model to show the impact of trade on relative returns of capital and labour. They also predicted that employment in the sector pursuing offshoring activities would go up.

The other studies incorporated offshoring with labour market imperfections. A general equilibrium model of offshoring (comprising two sectors), with unemployment to be caused by search frictions, was given by Mitra & Ranjan (2010). The model predicted that offshoring would lead to increase in wages and decrease in unemployment only if there is inter-sectoral mobility of labour. If inter-sectoral mobility of labour is limited then the effect on aggregate unemployment is shown to be ambiguous. According to this model if there is prefect substitutability between domestic labour and offshored inputs, productivity of firms would not increase and unemployment would not decrease. However, Ranjan (2013) showed otherwise. The model is built as search model with collective bargaining. According to this, due to lower costs of offshoring trade unions are induced to set lower wages. As trade unions

first set the wages after which firms decide on employment, the firms chose higher level of employment.

The model by Sethupathy (2013) accounted for productivity effects of offshoring with firm heterogeneity and search frictions in the labour market. The productivity of the offshoring firms increases which brings about a reallocation of production. The aggregate employment effects, however are ambiguous. The effects on more productive firms work both ways; employment increases due to positive effect on productivity and decreases due to negative effect from offshoring. The effect on least productive firms is clear, they contract and employment reduces therein.

The studies discussed above take job destruction as exogenous but Ranjan (2012) took it as endogenous and predicted that effect of trade liberalization on the aggregate unemployment is ambiguous. This is because the model showed that trade liberalization decreases unemployment in the exporting sector and increases it in the import competing sector of the country.

2.2.3.1 Review of Theoretical Literature on Trade Liberalization and Wage Inequality

An important theorem for wage inequality, Factor Price Equalization theorem, implies trade openness would lead to equality of wages across countries and hence, labour would earn more (less) in poor (rich) countries. Within a developing country, SS theorem predicts that openness would lead to fall in wage inequality in unskilled labour abundant (developing) country and would increase it in skilled labour abundant (developed) country. However, contrary to these traditional theories of international trade, the inequality (especially within-country inequality) in both developed and developing countries have experienced an increasing trend over the past two to three decades (Harrison et al., 2010). There have been widespread theoretical developments trying to explain this trend, which can be classified into three categories:

The first strand of literature expand the horizon of traditional theories of trade to bring in the changes in the pattern of trade and other changes. Various attempts have been made to reformulate the traditional HO and SS theorems by relooking at their assumptions and by incorporating the characteristics of the trading developing countries and their industries.

In the aftermath of the Leontief paradox, the Heckscher-Ohlin-Vanek (HOV) theorem was used to examine the validity of the HO theory by analysing the factor

content model of exports and imports. It says that a country should be a net exporter of its relatively abundant factor. So, one explanation of the growing wage inequality in the developing country is that the country (abundant in unskilled labour) becomes a net exporter of skilled labour or net importer of unskilled labour.

The HO model assumes that the factors are fully mobile across sectors/industries, which is not the case with many developing economies characterised by the labour market rigidities. In contrast, specific-factors (Ricardo-Viner) model assumes that one or more factors of production are immobile. This theory given in Jones (1971) predicted that trade would tend to lower (increase) the earnings of factors specific to import competing industries (exporting industries). Thus, according to this theory, if labour is immobile in the short run, then industry wage premiums could be influenced by trade liberalization in product and factor markets characterized by perfect competition. The additional channels of capital and labour rents, through which trade liberalization affects wage premiums, emerges with the introduction of imperfect product and factor markets (Katz et.al. 1989).

Davis (1996) presented a model with the hypothesis a country must not be considered in an absolute perspective but in a relative position in relation to other countries within the same "cone of diversification" (defined as countries with similar endowments and producing the same range of goods). The model took two cones, one each for developed and developing countries. This framework helped to explain that trade liberalization can increase the demand and wages for the skilled labour in a developing country, if skilled labour is in higher supply in this country relative to other countries in its cone. At the same time, in another country which has a relatively higher unskilled labour supply in the same cone, wage inequality can decline.

To fill the gap between these trade theories and the trend of rising inequality in the developing countries, few qualifications were added to the basic HO model such as, production sharing or offshoring; and search frictions and unemployment (Harrison et al., 2010).

Batra & Beladi (2010) incorporated offshoring in the standard HO model of two sector and two factor and predicted that off shoring works in the same way as SS theorem. They showed that if off shoring sector is relatively capital intensive, then it raises the return to capital and lowers the return to labour. They also showed that off shoring generally raises the GDP of the country, thus giving the similar results as the HO theorem.

The HO model assumed that trade occurs in only final goods. However, this assumption had been challenged by Feenstra and Hanson (1996), which gave a model of offshoring, emphasizing the growing trade in intermediate goods in recent decades. They used a simple model of heterogeneity in activities within an industry. According to this model, the developed countries being more skill-rich counties would allocate more skill intensive task to their workers and would off shore less skill-intensive tasks to developing nations, which are skill-poor. These reallocated tasks though, less skill-intensive for the developed country, in comparison to the existing skill levels of the developing country, turn out to be more skill - intensive. This results in increase in demand for skill-intensive labour in both countries, which raises equilibrium skill premium and thereby the inequality of wages in both.

However, there are two caveats to the above result: Firstly the same result of increase in wage inequality (due to skilled labour demand) can occur because of skill-biased technological change. It is then left to the empirical studies to segregate the two and to analyse the role played by these two effects (Feenstra & Hanson, 2003). Secondly, it is possible that there is a concomitant increase in real wages of all workers in the developing countries. This is because off shoring leads to productivity gains for the firms, which lower the prices for final goods. This fall in prices can be more than fall in nominal wages of either skilled or unskilled workers leading to concomitant increase in real wages. Also, if these productivity increases are passed on to the workers (by increasing their wages), it would again lead to increase in real wages. Bakhtiari (2012) found that offshoring leads to the endogenous shifts in aggregate productivity, which is advantageous to skilled workers. The loss of jobs of unskilled workers in the offshoring firms increase their relative supply, and the integrated firms (not offshoring) change their labour mix in the favour of unskilled workers. This reallocation between the two types of firms can lead to rise in real wage of the unskilled workers.

Pant & Barua (2014) formulated two models for the developing countries based on the traditional HO model; first by introducing a specific factor and second by introducing an intermediate good, which is non-traded. This formulation moved away from the qualifications to the basic theory of off shoring and imperfect competition to explain the relationship between trade and wage inequality. The models also looked at the absolute incomes of the skilled and unskilled labour and hence predicted for the impact on the poverty of the developing economies. Their first model showed that if the export sector of the country is less skill intensive and productivity of skilled labour

is more than unskilled labour, then in that case, both skilled and unskilled labour will experience an increase in their absolute wage rates. This would raise the wage inequality but would not increase the absolute poverty. The second model stated that the effect of trade openness on the wage inequality is dependent on whether the non-traded intermediate goods are used in the export sector or not. The wage inequality would increase if these goods are not employed in the export sector.

The second strand of literature retreat from taking trade as an explanation for the observed increase in inequality, and study other factors as SBTC, capital flows etc.

An important explanation has been sought in the SBTC, which is a change in technology leading to rise in the skilled labour demand (Harrison et al., 2010). According to Krugman (2000), if the progress in technology is skill-biased, implying the rise in the skilled to unskilled employment ratio at any skilled-unskilled wage ratio, then it would lead to skill premium increasing and thereby also wage inequality. However, magnitude of this effect will depend on the skilled and unskilled labours' elasticities of supply and the elasticity of substitution.

There has been debate about whether skill biased technological change has been exogenous to trade openness or is it a product of trade openness. It has been recognized that the distributional changes observed are due to the interactions of trade openness with SBTC and hence trade reforms are indirectly responsible for rising skill premium. This in-flow of technology due to trade liberalization has been termed as 'skill-enhancing trade hypotheses by Robbins (1996).

One channel through which trade openness would have contributed to SBTC is the hypothesis of "defensive innovation" given by Wood (1995). The increase in the competition in the wake of liberalization would induce firms to adopt existing new technologies or invest on research & development. Another argument provided by Acemoglu (2003) stated that technological change is endogeneous. The increased capital goods imports would also increase the demand of skilled labour as they are complementary to each other.

Feenstra & Hanson (1996) developed a model that showed flow of capital from developed to developing countries as an explanation for the rising inequality. This capital flow to the developing countries significantly influences their investment and the adoption of technologies, thus increasing the relative demand for skilled labour and hence, inequality of wages.

The traditional theories of trade explain the wage inequality arising due to inter industry movement of labour leading to a shift towards skill-intensive sectors. The empirical evidence, however, found huge evidence of wage inequality arising due to within industry patterns and not inter industry differences (Goldberg & Pavcnik, 2007).

The third strand of literature separates itself from the traditional theories and try to explain these trends by bringing in within industry factors as heterogeneous firms, effects of labour market frictions and incomplete contracts in their theoretical models.

Melitz (2003) incorporated heterogeneous firms (in terms of productivity) into a model of trade theory, which led to many developments in the trade theory. According to this, given the fixed cost of exporting, initially the more productive firms start exporting (because of higher profitability in the export market) and expand and less productive firms contract. This leads to an increase in the aggregate productivity as the labour (taken as pure production input) reallocates from less to more productive firms in the industry. However, in this model labour is assumed to be homogeneous and labour market as perfectly competitive and therefore, this reallocation has no effect on the wage inequality.

This model has been extended to explain the impact of trade liberalization on wage inequality across firms and workers within an industry. Broadly three models are present in the literature which either take firm heterogeneity as an exogenous characteristic or as an endogenous choice.

The first model given by Amiti & Davis (2011) extended the above model by taking the same assumption of exogenous firm heterogeneity and homogeneity of workers. The model showed that more profitable firms pay higher wages and hence wage distribution in the economy is affected. This is also the case of labour market frictions as different firms are paying different wages to the workers with same characteristics.

The second model given by Verhoogen (2008), stated that exporting firms need to upgrade the quality of their output. Given the assumption that workers are heterogeneous in ability and firms are heterogeneous in the sense that by employing same inputs they are able to produce goods of different qualities. So exporting firms hire better quality labour hence pay higher wages to them, leading to growing inequality.

The third model is given by Helpman et.al. (2010) which assumed that workers are of different quality and this leads to firm heterogeneity as they employ different

quality workers. The firm incurs a cost to search and employ the suitable worker. Since replacing a worker is costlier for larger firms and there is scarcity of workers with high ability, larger firms pay higher wages. This mechanism is reinforced by the trade openness as more productive firms have a higher incentive to screen and hire workers since they are competing in the export market and need to produce "good" quality products.

2.2.4 Government

The last static link is through government functions of taxes and expenditure. It is expected that trade liberalization will reduce government's revenues. The fall in government revenue would affect the supply of publicly provided goods, which would then adversely affect poor, as these goods form an important component of their total consumption. It is assumed that fall in government revenues would lead to reduction in social expenditures, especially on health and education, which would affect poor more than the rich. However, the relationships between trade liberalisation, revenue of the government, their expenditure, and specifically expenditures for the poor are indirect, complex and also ambiguous. Even is revenue is increasing due to liberalisation, it may go towards increased spending on the poor. Similarly, with no change in trade or revenues, policies can be framed to direct the public expenditure towards pro-poor sectors and areas (Conway, 2004).

This further leads to the question of whether there is any role played by trade liberalization in restricting government's policies of spending and taxation such that it impacts poverty. Eventually, it is policy decision by the governments of how to raise revenues and incur expenditures (Winters, 2000b). Fear is that commitments and bindings at the World Trade Organization (WTO) may prevent governments from pursuing pro poor policies. Also Rodrik (1997) argues that with increased openness mobile factors cannot be taxed which will reduce government's ability to increase revenues.

Hence, the key questions are: Is there actually a cut in government revenue due to liberalization?; Will the falling revenues from taxation hurt the poor?; Whether trade liberalization influences government's taxation and spending policies to adversely affect poverty?

2.3 Dynamic Effects of Trade and Poverty Relationship

The dynamic argument is in the context of economic growth achieved through liberalisation of trade. Trade openness offers larger investment incentives, the externalities of scale, increased productivity due to technological improvement, and potential for innovations to sustain growth (Berg & Krueger, 2003; Grossman & Helpman, 1991). It is also recognised that economic growth is very important to alleviate poverty. The World Bank regards globalisation as a strong tool for reduction in poverty (World Bank 2002). Unless growth leads to vast worsening of income distribution, average incomes will increase and the absolute poverty will decline.

There is a vast theoretical literature on the relation between trade openness and growth. Trade has been characterized as "engine of growth", long ago in 1940s. The Harrod – Domar model was used extensively in 1950s. The model shows how capital accumulation promotes growth and reflects on the importance of savings and technology in determining the capital accumulation. The model suggested that increase in the rate of savings and decrease in incremental capital output ratio would lead to economic growth. Even when trade is introduced in the model, it remains relevant and states that if trade improves efficiency in the use of resources, incremental capital – output ratio will decline, leading to increase in the growth rate.

Between 1960s and 70s the dominant approach to the analysis of growth was the Solow neoclassical model of economic growth. It is built on the neoclassical aggregate production function, where real output is a function of capital, labour and technology (treated as exogenous and depending on time). In this theory, technology is treated as an international public good, available equally to all countries. The model given by Solow shows that trade has no permanent effect on the long run growth. The basic neoclassical growth model also takes no direct link from openness to economic growth. According to it, technology is the sole determinant of long-run per capita income growth. This implies in the long run, growth is not influenced by the interaction with other countries.

However, the assumption and predictions of the model suffer from two main limitations (Janvry & Sadoulet, 2016). First, the model is incomplete in the sense that it gives a major role to technology in explaining growth but technology growth is not explained by the model. Second, the model predicts that countries with same rate of saving, population growth and technological change would achieve the same level of per capita income. This however, was not found to be supported by empirical evidence.

In spite of these problems, Solow model is the starting point of any discussion on the economic growth models. Its important contribution is in providing with a growth accounting framework so widespread in use in growth empirics.

Relying only on the differences in capital-labour ratios, the Solow model fails to explain the wide disparities in per capita income levels across countries and the lack of convergence of incomes. In response, Mankiw et al. (1992) gave the 'augmented' Solow model; augmenting the role of capital by including accumulation of human capital in addition to physical capital. They identified accumulation of inputs (labour, capital) and technological progress as the proximate causes of growth. But to understand the disparities of income across countries, they moved beyond these proximate causes to incorporate other fundamental determinants as human capital. Thus, differences in savings rate, population growth rate and human capital i.e. education provide a consistent explanation for variations in cross-country growth rates. This framework, more popularly known as Mankiw, Romer and Weil (MRW) model, has become the workhorse in the cross-country empirical literature on growth.

Endogenous growth theories emerged to a great extent from the contributions of Romer (1986) and Lucas (1988) in 1980s. The theory explains the technological changes and the how these can be increased, thus making technology as an endogenous factor, as opposed to exogenous in the Solow model. The technology is not an international public good, as was taken in Solow model. The firms invest in research and development activities to cap sources of productivity growth. Also, according to Solow model, capital accumulation plays no role in achieving long run economic growth, whereas in endogenous growth model, if technological progress occurs in capital goods then capital accumulation would be an important source of productivity growth. Thus, theory also explains the conditional convergence across countries due to differences in the technological progress amongst them. In this growth theory, there is no steady state income level. The growth rates can increase over time and income disparities across countries can persist forever.

Endogenous growth theories, further elaborate dynamic effect of trade in its role in technological and knowledge spill-overs. The link between trade and growth operates partly by technical progress entering the domestic economy due to trade – either from exports, from imports or from the sharing of technology from other countries (Winters, 2000b). There are various channels of effect of trade liberalization on economic growth. Higher trade or capital movements could increase growth rate by increasing

productivity or increasing the stock of capital or increased research and development activity. The imports of goods would bring in newer technology, increases productivity. The foreign investment inflows allows for the potential transfer of technology.

The majority of economists agree to positive effects of trade liberalization on economic growth. But few as Rodriguez & Rodrik (1999) and Rodrik et.al. (2004) remained critical of putting too much emphasis on globalization for the economic growth. He postulated that developing countries need to also focus on domestic institutions and investors in formulating growth strategy rather than relying solely on globalization. Trade openness is an important determinant for economic growth but to fully exploit its beneficial effects, the developing countries need to concentrate on complementary domestic strategy and institutions. Thus, both endogenous models and MRW models provide important tools for analyzing the effect of trade openness on economic growth, but do not predict that the effect operates positively in all countries and in all situations; country specific factors play an important role herein.

The changes in the poverty rate are the consequence of changes in mean income and distribution of income (Bourguinon, 2003). Hence, for analysing the effect of trade openness on poverty through its impact on growth, it is relevant to incorporate the poverty - growth - inequality triangle. The static effect of trade liberalization on income distribution is through relative price and wage changes whereas, the dynamic, indirect link, operates the effect of trade on growth and income inequality and then eventually the impact on poverty. The price link operates through the changes in household production and consumption (Goldberg & Pavcnik, 2004). It is expected that the availability of traded goods will increase and prices decline, which would shift the demand towards tradable goods and away from non-tradable goods, which would adversely affect the earning prospects of the poor. The non-tradable goods such as food items comprise a larger proportion of household expenditure of poor sections than richer sections of the population. Since, the consumption of household is dependent on its relative position in the welfare distribution, this price rise in response to trade liberalization, may affect inequality of the households in the economy.

Kuznets (1955) gave the inverted-U theory, depicting the non-linear relationship between economic growth and income inequality. It showed that at the early stage of development, economic growth increases inequality, but will fall at the later stage of development. In contrast, Todaro's "trickle down" theory postulated that economic growth would help in creating employment and economic opportunities for

the poor and thus, they also share the economic and social benefits of growth. This raises an important question: Whether growth led by trade liberalization is pro poor with positive effect on distribution? If not and it leads to worsening of the distribution of income then despite its positive impact on growth, trade liberalization would not lead to fall in poverty (Santos, 2012). Hence, the relationship between economic growth and income inequality is an important to be considered but is inconclusive in the literature.

Furthermore, the various channels of the impact of trade liberalization on inequality via wages are increase of the skill premium; change in industry wage premia; change in the size of informal sector. According to Goldberg & Pavcnik (2005), most of the work is confined to wage channel as there is limited data available to carry on empirical work on the production and consumption.

2.4 Trade and Poverty: Empirical Analysis of Causal Relation through Growth and Inequality

2.4.1 Introduction

Trade and global flows have been associated with poverty reduction via their impact on growth. There had been many studies concentrating on link between trade and growth but survey of those studies provides mixed results. There has been consensus on link between growth and poverty i.e. growth leads to reduction in poverty.

Most of the literature tests for either the impact of trade liberalization on growth (assuming growth would lead to fall in poverty) or studies the impact of growth on poverty (assuming that growth has occurred due to trade liberalization). There are very few studies which have analysed these relations jointly. In those studies, the attempt has been made to estimate the long run effect of trade liberalization on poverty reduction through the effect on growth following two step procedure. The impact of trade liberalization on productivity and economic growth is estimated and then the impact of growth on poverty is estimated. A good survey is provided in Winters et.al. (2004) covering studies that are either cross country examination or single country case studies.

2.4.2 Empirical Evidence

A number of cross-country studies based on macro analysis, have attempted to anlyse the impact of trade reforms on economic growth (Dollar, 2001; Sachs & Warner, 1995; Edwards, 1998). These studies found that trade openness leads to rapid growth.

Wacziarg & Welch (2003) found positive effects of liberalization on within country growth, openness and investment rates. Harrison (2006) also looked at the linkages between trade liberalization and growth and finds that an increase in openness leads to increase in aggregate income. It also further analysed that growth has been pro poor as it reduced the proportion of poor population.

The study by Liu, Shu & Sinclair (2009) on nine Asian economies, analysed empirical relationship between exports, imports, foreign direct investment (FDI) and economic growth in time series framework and concluded that trade liberalization and FDI inflows have significantly influenced growth in these economies. More recently, Villaverde & Maza (2011) also showed that economic globalisation has led to a higher growth and also to the worldwide convergence of income, in a study based on a sample of 101 countries for the period of 1970-2005.

On the other hand, there are studies refuting this hypothesis, like (Rajan, 2002), suggested that there is limited evidence of financial globalization (except foreign direct investment flows) positively impacting growth, let alone poverty reduction. Ravallion (2004) tried to test whether trade openness led to poverty reduction in China, using time series data. The results are uncertain regarding the effect of trade openness in driving the reduction of poverty. The empirical research (for example, Rodriguez & Rodrik, 1999; Harrison & Hansen, 1999) suggests there is no straightforward relationship between trade liberalization and growth. They have also criticized the above studies (Dollar, 2001; Sachs & Warner, 1995; Edwards, 1998) on various grounds as the econometric methodology followed; the measurement of their openness and protection variables (Sachs – Warner definition of openness) and not taking into account the endogeneity of trade openness.

The relationship between trade liberalisation and growth also depends on a many external as well as domestic factors. The researchers have used empirical evidence to support this argument. Bannister & Thugge (2001) emphasized on the existence of appropriate macroeconomic and structural policies and institutions as important factors influencing this relationship. McKay et al (2000) argued that country's domestic conditions, the way of implementing trade reforms and other complementary policies followed, play an important role. Chang et al. (2009) studied 82 countries (22 developed and 60 developing countries) for the period 1960-2000. They concluded that the positive effect of trade openness and growth can be made

stronger, especially for developing countries by following reforms in labour markets, financial development, infrastructure and governance.

The relation between economic growth and poverty reduction has been found to be strong and positive by various cross-country studies e.g. Ravallion (2004), Dollar and Kraay (2002), Ravallion & Chen (1997). Ravallion & Chen (1997) showed that growth led to reduction in poverty. According to their estimates, a 10% increase in the mean standard of living led to 31% average reduction in proportion of poor population. Ravallion (2001), on the other hand, found that a 1% increase in the per capita income can lead to average reduction of proportion of poor people by about 2.5%. Depending on the initial levels of inequality, this elasticity differed across countries.

Dollar (2001) argued that developing countries that have integrated faster into the world economy (both with respect to trade and direct investment) have experienced significant poverty reduction. For example, in Vietnam, poverty rate declined from 75% to 37% over a ten-year period of greater global integration. . Dollar & Kraay (2002), analysed 92 countries in their cross-country study and found that the bottom quintile's average income growth rate was not much different from the growth rate of aggregate per capita incomes. Thus its share in total income was quite stable.

Even if economic growth occurs due to trade, an important issue is the distribution of growth (Bird, 2004). So, growth is necessary, but is it also sufficient for poverty reduction? According to Kakwani, Prakash & Son (2000) economic growth can be 'pro-poor' if it's accompanied by a decline in inequality, as then poor will be benefitting more than the non-poor. One of the important concerns is that the pattern of growth emerging from open trade policies is biased towards the rich, and worsens the economy's income distribution (McCulloch et.al. 2001). The studies provide substantial evidence that liberalisation can cause increase in inequality (between and within countries) in both income and assets (Kanji & Menon-Sen, 2001).

Other studies however argue against this. Edwards (1998) suggested that there is no evidence that trade liberalization increases inequality. Most of the empirical work supports the argument that inequality falls when the economy grows (Ravallion and Datt, 2002, Ravallion, 2001 and Dollar & Kraay, 2004). By taking data of the "globalizing developing economies" of 1980s, Dollar & Kraay (2004) found that growth in per capita income occurred from higher trade and led to a sharp reduction in absolute poverty in these countries. The poverty reduction is absolute and not relative, as the increased economic growth accompanied by increased globalisation is

'distribution neutral'. Ianchovichina et al. (2001) argued that trade reform positively affect all income groups whereas, White & Anderson (2000) showed that there may be a trade-off between growth and distribution, and that the effect on distribution would be more important for the poor.

As there is a two way relationship between trade openness and growth, the single equation analysis described above suffers from the limitation of not taking it onto account. This has been criticized extensively by Rodriguez & Rodrik (op. cit). The solution lies in treating the trade openness as an endogenous variable in the estimation of the growth equation or to estimate the two jointly. This however, is incorporated in relatively fewer studies. The problem of endogeneity of trade openness measure is addressed in the estimation by either using the Generalised Methods of Moments (GMM) or system of equations to be estimated jointly by using simultaneous equation models (SEM).

Donald & Majid (2010), Irwin & Tervio (2002) and Busse & Koniger (2012) used the System GMM estimator. This approach handles the problem of endogeneity and enables to estimate the impact of trade openness on the growth but not vice versa. The results indicated that trade openness positively and significantly impacted growth; and this was true also separately for exports and imports.

Wacziarg (2001), Berg (1996), Salvatore (1983), Esfahani (1991) and Yasmin et.al. (2006) followed the SEM approach. Wacziarg (2001) built a set of equations describing the trade on various growth determinants by capturing different channels of trade impacting growth of the economies. The structural model consisted of equations for the growth of per capita income, trade policy and six equations each describing the channels of the effects of trade policy on different determinants of growth. The results showed that the trade policy openness positively and significantly affects the economic growth.

The same results are obtained by Berg (1996) based on the model by Esfahani (1991), which developed a four equations simultaneous model for GDP, investment, exports and imports.

$$GGDP = a_0 + a_1\,INV + a_2GPOP + a_3GREX + a_4GRIM \quad (1)$$

$$INV = b_0 + b_1GPCY + b_2PCY + b_3GREX + b_4FORCAP \quad (2)$$

$$GREX = c_0 + c_1GGDP + c_2RER + c_3TPGROWTH \quad (3)$$

$$GRIM = d_0 + d_1GGDP + d_2RER + d_3PCY + d_4FORCAP \quad (4s)$$

where GGDP = Growth of Real GDP; INV = Investment to GDP ratio; GPOP = Growth of population; GREX = Growth of exports; GRIM = Growth of imports; GPCY = Growth of per capita income; PCY = per capita income; FORCAP = foreign capital inflows; RER = exchange rate (real) ; TPGROWTH = weighted average of the GDP growth rates of principal trade partners

However, such robust relationship between trade openness and growth is getting reflected in the country based studies such as Yasmin et.al. (2006) for Pakistan, Huang et.al. (2009) and Li (2009) for China. For example, Yasmin et.al. (2006), tried to analyse trade liberalization's impact on per capita GDP, income inequality, poverty and unemployment in a model consisting of four simultaneous equations:

$$LP = \alpha_0 + \alpha_1 LG + \alpha_2 LPGDP + \alpha_3 LEMP + \alpha_4 LTL \quad (1)$$

$$LG = \beta_0 + \beta_1 LPGDP + \beta_2 LCPI + \beta_3 LTL \quad (2)$$

$$LPGDP = \gamma_0 + \gamma_1 LEMP + \gamma_2 LHK + \gamma_3 LINV + \gamma_4 LTL + \gamma_5 TG \quad (3)$$

$$LEMP = \lambda_0 + \lambda_1 LPGDP + \lambda_2 LW + \lambda_3 LINV + \lambda_4 TG + \lambda_5 LTL \quad (4)$$

where P represents incidence of poverty, G represents Gini coefficient, PGDP represents per capita gross domestic product, EMP represents employment, CPI represents inflation, HK represents human capital, W represents real wages, INV represents domestic investment, TG represents dummy variable for type of government, and TL represents trade liberalization.

The results indicated that trade liberalization affects employment positively but PGDP negatively in the country. Also, trade liberalization was increasing income inequality in the country, though poverty was not found to be affected by it. This showed that country's domestic factors, macroeconomic scenario and mediating factors play a very important role in determining this relationship which cannot be generalized using the cross country studies' analysis.

2.4.3 Summary

Thus, there is no strong conclusive evidence of whether trade leads to growth. Trade liberalisation cannot be presumed per se to accelerate growth. This is mainly due to problem in identifying the direction of causation in this relationship i.e. are countries growing due to trade openness or the becoming more open due to growth. Another issue in empirical testing of this relationship is how to measure the trade openness as countries follow tariffs and also non-tariff barriers (as quotas, bans and other quantitative restrictions) to restrict trade.

In contrast, there is clear evidence on the positive impact of growth on poverty and in the last few decades poverty has declined in many developing countries. But, at the same time, in most parts of it and even in two large countries – China and India, income inequality has increased. The debate is still continuing on the role of trade in this increase in inequality.

The empirical literature largely employs cross-country regressions for analysing the determinants of growth and poverty. There are limitations of these cross country regressions and hence, are not accepted to be reliable enough for policy implications. One of the issues is of measuring trade openness. Secondly, there is a need to control for institutional and other factors across countries. Furthermore, these studies have to standardize the definition of poverty, which is not desirable. Another complication is to obtain comparable data across broad set of countries (Rodriguez & Rodrik, op. cit).

Even though studies are trying to address two way causality of trade openness and growth by employing GMM or SEM, instead of single equation estimation, the analysis reflects the need for more country specific studies. It has been observed that country's domestic factors, macroeconomic scenario and mediating factors play a very important role in determining this relationship which cannot be generalized using the cross country studies' analysis. Therefore, for the above reasons, there is a renewed attention to the advantages of country study and also sub national level of analyses and approaches.

2.5 Trade and Poverty: Empirical Analysis of Causal Relation through Employment

2.5.1 Introduction

There is increasing recognition that any analysis of trade liberalization and poverty is incomplete without analysing the effects on the factor / labour market, particularly on employment and wages. The findings of Krueger (1983) also substantiated the importance of effects of trade on employment and wages in developing countries. This is an important link as changes in employment and wages will have strong impacts on the poverty levels of the country.

The world economy is experiencing a decline in employment to population ratio for most of its regions and hence unemployment problem is drawing attention of international research and policy design. The review of theoretical literature based on studies such as Felbermayr et.al. (2011a), Helpman & Itskhoki (2010), Egger &

Kreickemeier (2009), Davis (1998), Matusz (1986 & 1996), Davidson et al. (1988, 1999) is presented in section 2.2.3.1 above. The studies have found conflicting, complex and ambiguous relationship between trade and aggregate employment, leading to an empirical assessment of whether and how trade affects the level of equilibrium employment (Davidson & Matusz, 2004). The next section reviews the empirical research on the subject.

2.5.2 Impact of Trade on Employment: Empirical Evidence

The proponents of globalization argue that trade expands export markets and hence, give a boost to domestic production, thereby creating more jobs. The paper by (Dutt, Mitra & Ranjan, 2009) empirically tested for both Ricardian and Hecksher-Ohlin models of trade and unemployment. The study used trade policy, unemployment and a number of control variables (like output volatility, black-market premium) on the panel data for 92 countries for the period 1990 – 2000, and found strong evidence for the negative impact of trade openness on unemployment. Although, when tested for two separate set of countries (labour abundant and capital abundant), the relationship was not found to be positive for the capital abundant countries.

Felbermayr et.al. (2011b) did not test for a specific theoretical model but presented some robust results for a cross-sections of countries. The paper found that higher openness to trade reduces unemployment. Most of regressions in this paper, provided an overwhelming evidence of a positive effect of trade on employment. Many labour economist have carried out similar analysis based on panel data of OECD countries. Few main studies in this area are Blanchard & Wolfers's (2000), Nickell et.al. (2005), Bassanini & Duval (2006, 2009), which concentrated on the impact on employment of labour market institutions and macroeconomic shocks and also presented a comprehensive survey.

Said & Elshennawy (2010) explored the same relation for manufacturing sector of Egypt for the period of 1993 – 2006 and provided further support to the above findings. The results showed that during the period of 1993-2006 (a period of significant reduction in trade barriers in Egypt) the manufacturing industries experienced increasing employment. This was also associated with increasing wages for workers in the manufacturing sector, but not for poor wage workers, where it departs from the theory. The similar results were obtained by Boulhol (2008). Also Matusz

(1996) study asserted that trade through improving economy-wide productivity reduces the unemployment rate.

The opponents of openness demonstrate that domestic output and employment falls, as lower production costs and fewer regulations in other countries lead to increase in imports and shift of production from domestic firms to foreign firms. Janiak (2006) and Davidson et al., (1999) showed that higher exposure to trade leads to increase in unemployment. The reason being that the shutting down of small low-productivity firms lead to employment losses that are greater than employment creation in large high-productivity firms.

The relationship between trade openness and unemployment depends on other important factors as skills of the labour force and labour market institutions. Sener (2001), Moore & Ranjan (2005) and Bazen & Cardebat (2010) argued that trade liberalization led to an increase in the unemployment of unskilled workers, but the effect on aggregate unemployment is ambiguous. This emphasized that labour possess differing abilities and cannot be treated as homogeneous. Hence, the employment effect of trade openness is also not same across all workers; it is ability-specific.

How the relationship gets affected by the labour market institutions of the countries has been explained in studies like Helpman & Itskhoki (2010) and Moore & Ranjan (2005), who argued that unemployment increases with lesser barriers on trade. Though, the exporting sectors is expanding but unemployment increases as workers are unable to reallocate towards the exporting sector due to frictions in the labour market.

The study by (Kim, 2011) empirically tested for the impact of international trade on aggregate unemployment and the relevance of labour market institutions. The study based on the period of 1961-2008 and employed data for 20 OECD. The results showed that growth in trade led to rise in aggregate unemployment, if the labour market institutions were rigid, and reduced aggregate unemployment when there were flexible labour market institutions. It provided a strong evidence of the importance of labour market institutions for analysing the relationship between trade and employment.

Hasan (2001) estimated reduced form equations for unemployment of the manufacturing sector and average real wages to analyse the effect of trade openness and rigidity of labour market. The study used panel data of 48 developing countries. The equations were as follows:

$$\log L_{it} = a_0 + a_{i1} \ln (T_{it}) + a_{i2} \ln (LR_{it}) + a_{i3} \ln (Z_{it}) + \varepsilon_{it}$$

$$\log W_{it} = b_0 + b_{i1} \ln (T_{it}) + b_{i2} \ln (LR_{it}) + b_{i3} \ln (Z_{it}) + \eta_{it}$$

where L and W are manufacturing sector's employment and wages for countries i and time t. T represents openness of trade and LR represents labour market regulations. Z denotes other factors as real GDP, an index of real exchange rate vis-à-vis dollar and the size of labour force. ε_{it} and η_{it} are the error terms. The results indicated that trade liberalization adversely affected employment and wages. There was some recovery at a later stage, but the recovery was stronger for wages as they became higher than before but employment was lowered though not significantly. The estimates also indicated that more rigid labour markets experienced higher wages but at the cost of lower employment. Thus, results suggested that trade liberalization is probably more advantageous for flexible labour markets and vice versa.

Another factor which can influence the impact on unemployment is how trade affects the own-price elasticity of labour demand. According to Rodrik (1997) trade increases the labour demand elasticity. This happens due to increase in trade in inputs, which leads to availability of more substitutes and hence raises the elasticity of substitution between labour and other inputs. It also affects it indirectly by increasing the elasticity of demand for import-competing goods because of increase in availability of cheaper imported goods. If trade openness leads to increase in productivity and output growth, then more elastic labour demand will lead to higher growth in wages and employment in those countries. This could then be another channel through which trade might benefit workers by raising their wages and reducing unemployment. The studies undertaken for the developed countries like Slaughter (2001) found mixed evidence of the rise in labour demand elasticity in the wake of trade liberalization. The studies undertaken for developing countries like Krishna et.al. (2001) found no significant effect of trade reforms on labour-demand elasticity.

2.5.3 Summary

From the above review, we can say that there are large number of empirical studies analysing the effects of trade liberalization on employment. Different approaches have been adopted to analyse this relationship, but there has been no clear cut conclusion. Generally one can say that the effect is also dependent on country specific factors and hence varies from country to country. So, it is considered better to undertake country level analysis for exploring the issue further. One shortcoming is that studies analysing trade and employment relationship largely focus on manufacturing employment, with not much concentration on agriculture or services sector. Can these

results be generalized to all sectors, to analyse the situation of aggregate employment is debatable.

2.6 Trade and Poverty: Empirical Analysis of Causal Relation through Wage Inequality

2.6.1 Introduction

The early developing East Asian economies experienced a decline in wage inequality, after openness was introduced in 1960s and 1970s, conforming the standard theory of trade. However, the countries opening in the later decades of 1980s onwards contradicted this and experienced an increase in wage inequality (Arbache, Dickerson & Green, 2004). In the last two to three decades inequality (both across country and within country) has reached such high levels to bring this concern to limelight of the economic research. The inequality has not only been increasing in the developed countries but also in the developing parts of the world. This trend is observed in all measures of inequality as income inequality, wage inequality, assets inequality or wage premia (Goldberg & Pavcnik, 2007). This was accompanied by countries following globalization, especially developing countries and hence it was made responsible for rising inequality. The globalization process involves removing of restriction in the movement of goods, service, labour and capital. As the present study focusses on trade openness, the review of studies empirically analysing the link between trade and wage inequality is presented in the next section.

2.6.2 Impact of Trade on Wage Inequality: Empirical Evidence

The literature documents wage inequality as either increase in gap between wages of skilled and unskilled workers called as skill premium or changes in industry wage premia. A good survey is provided in Goldberg & Pavcnik (2004 & 2007) dealing with wage inequality in manufacturing and / or organized production sectors of the economies.

Alternatively, studies such as Topalova (2005), Goldberg & Pavcnik (2005), Wei & Wu (2002), examined the changes in wage or income inequality within a region or country that has followed trade liberalization reforms. Wei & Wu (2002) stated that the income inequality in China increased during the period it liberalized trade and foreign direct investment. Wood (1999) also confirmed that same trend holds for many

middle-income Latin American countries as well India, China and Hong Kong. Goldberg & Pavcnik (2005) led to the same conclusion for Colombia.

Feliciano (2001) used micro-level data to analyze the impact of trade reform on wages and employment in Mexico. The study found that wage inequality increased in both non- tradable and tradable sector. Thus, trade reforms increased wage inequality. Greenaway, Hine & Wright (2011) examined the impact of trade on wages at industry level. It estimated wage equations across a panel data of industries of United Kingdom. The results suggested that on average increases in trade led to decrease in wages. The analysis also suggested that the wages of workers at the lower end of the income distribution were adversely affected thereby increasing wage inequality. Arbache, Dickerson & Green (2004) reviewed the effects of trade liberalisation on wages in Brazil. It found that after trade liberalization, wages fell considerably in the traded sector.

Stone & Cepeda (2011) analysed a panel of countries comprising both developed and developing economies. The empirical analysis showed a positive relationship between trade liberalization and wages such that imports led to higher wages. This was happening due to the productivity gains associated with imports. Tariffs were found to have a consistently negative impact on wages. The results also revealed a significant impact of imports on wage differentials, when wages were taken at the occupation level. These results hence, imply that trade could lead to an upward revision of wages for skilled workers and hence, imports tend to push wages up, rather than down.

A study by Bazen & Cardebat (2010) analysed the impact of trade in France, using sectoral data for the period 1985 - 1992. The period was divided in two sub periods of 1985 - 1989 and 1989 - 1992 to examine the effect of prices change on the sectoral skill intensity of production. The results suggested that in the latter half of the 1980s, trade reduced the relative employment of low skill workers, but it left the relative wages in low skill intensive sectors more or less constant. On the other hand, in the later period, the relative wages of low skill workers decreased but only in low-skill intensive sectors, and had no effect on their relative employment. The effects had been more pronounced in low-skill intensive sectors of production.

Various factors are attributed to this increase in skill premium observed in the countries as a response to trade openness (Goldberg & Pavcnik, op. cit). Firstly, the in-flow of skill- biased technology from the industrialized world. This effect is termed as

'skill-enhancing trade hypothesis' and is considered to be an important factor leading to increase in wage inequality in later liberalising developing countries of the world. Secondly, according to theories of trade, labour will relocate from sectors experiencing price decreases to sectors where price expands as a result of openness. However, such reallocation across sectors has not been happening in the developing countries either due to rigid labour markets, imperfect product markets (firms' response is to lower profit margins) so that there is not employment adjustment (in terms of employment generation) but relative wage adjustment, leading to rise skill premium. Thirdly, the rise in trade of intermediate goods and the expansion of 'global production sharing'. This increase in skill premium has also been associated with increase in returns to higher educational levels and to particular occupations for the developing economies, according to Cragg & Epelbaum (1996), and Kijima (2006).

The other factor affecting wage inequality is change in industry wage premia. An increasing number of papers are focussing on the industry wage premia and attributing it to workers' affiliation to different sectors to understand the effects of trade on wages. The focus is also on investigating the effect of trade reforms on inter-industry wage differentials, specifically in developing countries (Hasan & Chen, 2003), (Pavcnik et al., 2004), (Dutta, 2007). Caju, Rycx & Tojerow (2011) adopted a two-step procedure to estimate the effects of trade on the industry wage structure of Belgium for the period 1999 to 2006. First, industry wage premia are estimated using the wage equation:

$$\text{Ln } w_{ij} = X_{ij}\,\beta + \psi_k + Z_j\delta + \varepsilon_{ij}$$

where w_{ij} is the gross wage per hourof worker i in firm j, X_{ij} represents the individual characteristics of workers, ψ_k is the dummy variable relating to individual's industry affiliation and Z_j are characteristics of firm j. The coefficient of the industry dummy is the wage premium that estimates variation in wages that can be explained by the industry affiliation of the workers and not by the workers' characteristics. These industry wage premia are pooled together (IWD) to be used as a dependent variable in a regression equation below, to examine the effect of trade on wage premia.

$$IWD_{kt} = \beta_{im}\,Import_{k,t} + \beta_{ex}\,Export_{k,t} + \beta_h\,Hindex_{k,t} + DY_t + v_{kt}$$

where $Import_{k,t}$ and $Export_{k,t}$ are import penetrations and export ratios, respectively, $Hindex_{k,t}$ is a proxy for domestic competition and DY_t is a vector of year dummies. The results showed that high exposure to exports (imports) lead to higher (lower) industry wage differentials.

Hasan & Jandoc (2010) examineed the impact of trade liberalization on wage inequality in Philippines for the period 1994 - 2000. The results showed that the overall quantitative impact on wage inequality was not clear. The fall in trade protection (reduction in tariff rates) led to reduction in industry wage premiums and employment in industries that experienced a larger fall in protection and/or industries that were not exporting more. In contrast, in industries with low levels of import penetration, the fall in tariff rates is found to be raising industry skill premiums. To understand this further, they performed the wage decompositions exercise. The decomposition results suggested that trade liberalization was not affecting the wage distribution through either the channel of industry wage premium or industry-specific skill premium. These were accounting for a very small increase in wage inequality. However, there may be other factors that were leading to the impact of trade liberalization on the wage distribution and inequality.

Another study by (Pavcnik et.al. 2004) analysed the impact of trade liberalization of Brazil on the industry wage structure for the period 1988 – 1994. The analysis yielded the following findings. First, no association was found between trade liberalization and industry wage premiums. Moreover, no statistical significant relationship was found between reduction in tariffs and sector specific skill premiums. Overall, the study concluded that the trade reforms had not contributed to wage inequality between the skilled and unskilled through changes in wage premiums in industries or industry specific skill premiums.

These effects of trade on inter-industry wage differentials can be due to several factors. First, trade openness can lead to improvement in productivity of firm or industry, thereby increasing the relative wages of that industry. This has been shown in several studies like Krishna & Mitra (1998) and Topalova (2004). Second, because of labour market rigidity in developing countries, workers cannot easily move across sectors to take advantage of trade openness. Hence, industries having more than average tariff cuts also experience proportional declines in the wage premia (Dutta, 2007). Third factor is the presence of union bargaining. If unions bargain to share in industry rents (arising due to trade openness) through employment guarantees and not wage increases then industry wage premia would be reduced (Grossman (1984)).

2.6.3 Summary

It is clear from the review above, that studies do not reach a unified conclusion regarding the impact of trade on wages. However, most of the studies have found positive relation between trade liberalization and wage inequality and other measures of inequality. Also, it has been found that most industries in the developing countries are experiencing increase in the share of skilled workers pointing towards skilled-biased technological change. This is an important aspect in the current scenario of the rising inequality in countries.

The other factors identified as contributing to rising wage inequality are restriction on domestic factor mobility, labour market institutions and labour market conditions and the extent of liberalization in various sectors. The existing literature suffers from important limitation of restrictive analysis of two forms. One, by only concentrating on formal workers in the manufacturing sector, it leaves out the informal agricultural sector and services sector. Second, the existing evidence concentrates more on the narrow measures of inequality (skill premium or industry wage pemia) and the broader concepts of inequality (consumption or income), are not incorporated in studying the in equalizing effects of trade.

2.7 Trade and Poverty: Empirical Analysis of Causal Relation through other Factors

2.7.1 Introduction

An important channel through which trade liberalisation affects poverty is through price changes of tradable goods, their substitutes and also where these goods act as important inputs in production (McCulloch et.al. 2001). The studies concentrating on the effect of price changes (due to trade) on poverty, analyse this by either adopting partial or general equilibrium approach.

The studies based on partial equilibrium approach focus on the impact of price changes due expenditure of households and hence poverty. A good survey of such studies is provided by Hertel & Reimer (2004). General equilibrium studies assess the impact of such shocks across sectors, regions or countries. These studies are usually country specific and are based on Social Accounting Matrices of the economy. A recent approach followed is simulation in general equilibrium framework combined with post-simulation analysis on household survey data (Reimer, 2002). Again, Hertel & Reimer

(op. cit.) provides a survey of studies adopting general equilibrium framework for trade and poverty analysis.

2.7.2 Empirical Evidence

According to the World Development Report (2006), around 75 percent of the world's poor population is located in rural areas and most of them are dependent for their livelihoods on agriculture. Hence, an important link between international trade and poverty is prices of agricultural commodities and many studies concentrate on empirically testing for this relationship. Some examples are Gilbert (2008), de Janvry & Sadoulet (2010) and Ivanic & Martin (2008).

Gilbert (2008), assessed the implications of agricultural trade liberalization and poverty for Asian-Pacific economies. The results suggested that proposed agricultural reforms under Doha would not generate large welfare benefits for most of the countries of this region. Also, these reforms were expected to hit the poor adversely by lowering wages and increasing prices of food articles.

According to Verma et.al. (20011), because of the inherent volatility of agricultural markets, the reforms of agricultural protection in developed economies would not have significant impact on world prices. They tested this invisibility hypothesis which implied that the impact on agricultural prices and the concomitant effect on poverty will be not be statistically significant. The focus was only on staple grains, which had high trade barriers and represented a major share of the expenditure of poor households. This volatility of markets affect the supply, which was incorporated in a Computable General Equilibrium (CGE) framework. The study found that in the short-run poverty was not significantly impacted by the liberalization of agriculture's trade. So, this study failed to reject the invisibility hypothesis in the short run. According to the authors, this does not mean that agricultural trade liberalization is not relevant. The countries are showing impacts of agricultural trade reforms in the long run, but in the short run these effects are not getting reflected due to market..

Another set of studies incorporate household survey data in a general equilibrium framework in a two-step procedure. The first step involves simulation of a general equilibrium model to get commodity and factor price changes and then, in the second step, feeding these changes in a micro simulation framework to calculate the effects on households using various poverty measures.

Chen & Ravallion (2003) explored the poverty implications of WTO accession by China using a CGE model and household survey data. They concluded that the effects of price change are heterogeneous on different types of households even with the same pre-reform level of welfare, referred to as 'horizontal inequality'.

Porto (2004) developed an empirical framework employing a general equilibrium model to account for effects of trade on both labour market and consumption in Argentina. The results showed that prices of unskilled-labour intensive sectors increased, while prices of skilled-labour intensive good declined due to tariff cuts. These price changes translated into rise in unskilled workers wages and fall in skilled workers wages. Hence, unskilled labour, who lie at the lower end of expenditure distribution, benefitted via labour income channel. Two interesting findings emerged for the consumption effects. This effect is found to be biased towards rich, because the model predicted that prices of those food and beverages that are unskilled-labour intensive increased and this is the category, on which a large share of their budget is spent by the poorer households. The model also predicted that prices of non-traded goods such as health, education and leisure goods will decline. Their shares in the budget increase with per capita household expenditure. The final effect is dependent on the relative magnitudes of the consumption and labour income effects. It was found that the labour income effects were higher than the consumption effects. Hence, tariff cuts were found to be leading to reduction in poverty in Argentina.

Cockburn et.al. (2008) compiled seven country studies of Asia and Africa, analysing impact of trade on poverty. The studies adopted country specific CGE models to analyse the factors that play an important role in trade liberalization's impact on poverty. Some broad conclusions are as follows; (a) The effect of trade liberalization on welfare and poverty was positive, but small. (b) For all countries (except one) the increase in welfare and fall in poverty was higher for urban households. The rural areas of five out of seven countries experienced a fall in welfare and increase in poverty. (c) Overall, trade liberalization beneficially impacted industrial sectors –more relative to the agriculture secto. (d) In all countries, nominal income tended to fall, more so in rural areas.

Hertel et.al. (2007) focussed on the impacts of tariff cuts in agriculture sector of the developing country (under Doha Development Agenda) on the poverty. They argued that it is better to cut tariffs on staple foods in developing countries. This would make food available at world prices for the poor, thereby reducing their cost of living

and hence poverty reduction. On the other hand, such tariff cuts would also hurt the incomes of the people dependent on agriculture. They checked these contentions for fifteen developing countries and found increases in poverty in the agriculture sector. However, they found if the cuts in agricultural tariff are followed in all developing countries, such negative effects are minimized and the poverty reducing impact of lower food prices would then dominate.

2.7.3 Summary

Trade liberalization is likely to affect poverty through the effect of relative changes in price in consumption and labour markets. The general equilibrium models extend the partial equilibrium models to include a full vector of commodity and factor prices. The approach can analyze the effects of trade liberalization on both wages and consumption. Thus, it provides the overall effect of trade reforms, not concentrating on only one particular channel of either consumption or factor markets. Households at different parts of income or expenditure distribution vary in their consumption and abilities and this framework allows to incorporate these variations. This is important for the analysis as the price changes exercise distinct effects on households along the distribution of household per capita expenditures. The empirical studies using simulations suggest that these effects are significant and need to be studied more extensively.

2.8 Conclusion

There is a huge literature analysing the impact of trade openness on poverty and diversity of methods and approaches examining this relationship. The relationship is not direct and it operates via different channels. The review above takes the classification of channels, as given by Winters (2000a) and characterize them as static (further categorized into households, distribution, factor markets and government) or dynamic (via growth) impacts of trade openness on poverty. This classification is not sacrosanct but is undertaken as it serves the purpose of defining the objectives and form in which the present study would attempt to analyse this important relation for the Indian economy. The survey presented above is not exhaustive but attempts to discuss few relevant studies for each category.

The review of static and dynamic effects leads to the same conclusion that there is no universal agreement on the relationship between trade liberalization and poverty. Conventional theory makes the case for trade liberalisation based on both static and dynamic benefits of trade. However, given the importance of growth and development in developing countries, there is more focus on the dynamic benefits of trade. But, despite the contributions of new growth and trade theories, one cannot say that trade liberalization increases growth rates of the economies. The adjustment associated with the very nature of trade liberalization is likely to have distributional impacts. These effects on income distribution can either worsen or improve the income distribution in countries, especially developing countries. Hence, the issue is largely empirical in nature and there is enormous empirical literature exploring the connections between trade, growth, poverty and inequality.

Few gaps of literature emerging from the above review are to be noted. Firstly, in analysing the relationship via the dynamic channel of growth, the two causal relations of - trade impacting growth and growth impact of poverty - are studied separately. The first set of studies provide mixed results though there is consensus on the evidence of existence of the second relationship. There are few studies analysing these two relationships together to predict the impact of trade liberalization on poverty.

Secondly, it is observed that even if trade openness induces faster growth, the burden of adjustment may fall disproportionately on poor. It is therefore, important to include the inequality aspect in this channel of analysis to fully capture the impact of trade openness on poverty. The need of the hour is to study these relations together and to the best of knowledge, this has not been covered in any study so far.

Thirdly, in analysing the trade – poverty relationship via factor (labour) markets the focus is on either employment or wage inequality of manufacturing sector and the urban areas of the countries. This has limited usefulness for poverty implications, as large proportion of world's poor reside in rural areas and derive their livelihood from agriculture than manufacturing sectors, leaving them out of purview of these studies.

Fourthly, the existing evidence on wage inequality, concentrates more on narrow measures of inequality as skill premium or industry wage pemia and are not incorporating broader concepts of inequality as gini coefficient or theil inequality measures, which would calculate the wage inequality amongst all wage earners in the wage distribution.

Lastly, largely the studies undertake cross-country analysis, whereas it has been recognized that country's domestic factors and macroeconomic scenario are important in determining this relationship.

The present study attempts to fill some of the gaps by empirically analysing the impact of trade openness on poverty in India via three channels. First, it attempts to analyse the two step causal relation between trade liberalization and poverty, jointly in a simultaneous equation model. As established above that inequality is an important aspect affecting the impact of trade liberalization on poverty, the model also incorporates this aspect. There are very few studies that have adopted this approach to estimate the impact of trade openness on poverty through its effect on growth and inequality and no such study was found for India. Second, it studies the impact of trade openness on total unemployment rate (not only manufacturing unemployment) and third on the wage inequality (taking the broader measure of wage inequality).

Largely the present literature on India, explore only one of the channels to analyse the impact of trade liberalization. Hence, there is a potential gain from studying this relationship in a more comprehensive way. However, as the focus of study is on macroeconomic linkages of trade and poverty, the present analysis leaves out two channels i.e. the micro impact of changes in prices (due to trade openness) on the consumption and production of households and the impact of government revenue. The review of studies on the Indian economy, pertaining to three objectives of the study are presented in chapters 4, 5 and 6 respectively.

Chapter 3

Trade Liberalization and Poverty: Concepts, Measures and Extent

3.1 Introduction

This chapter concentrates on providing the background of trade liberalization and poverty in India, along with discussing the recent situation. India followed trade liberalization process in 1990s. Supporters of these reforms argued that India would be able to exploit its comparative advantage in labour-intensive goods and services; which would help the poor. As India proceeded on the path of trade liberalization, it also experienced decline in poverty and increase in inequality in both rural and urban areas (Datt & Ravallion, 2011).

The impact of trade openness on poverty (and inequality), unemployment and wage inequality of the states of India are three questions raised in the present study. Thus, to arrive at a measure of trade openness for the states, is very important for the empirical analysis. The focus of this chapter is hence fourfold; one is to give account of trade liberalization policies followed, and its impact on the Indian economy since 1991; secondly to discuss in detail the methodology followed to construct trade openness measures for the states of India; thirdly, to discuss trends in trade openness measures for the states and fourthly to discuss the concepts, measures and trends of poverty and inequality in India since 1991. The chapter is accordingly divided into the respective four sections.

3.2 Trade Policy Reforms and Performance

3.2.1 Background

India pursued a development strategy of national self-sufficiency till 1980s, and pushed for government regulation of the economy. The strategy followed was interventionist and inward looking comprising of protection of imports, stringent rules for industrial licensing, and public ownership of heavy industries. During this period, the trade regime of India was found to be most restrictive amongst all Asian economies. India changed its development strategy in 1980s, and started giving a gradual push to exports for achieving higher growth and also liberalize imports for exporters. The initial reforms were taken by government in various directions such as control of states on

both external and domestic industrial policy was reduced, licensing requirements were eased, quantitative restrictions and tariffs were reduced and the structure of tariffs was also simplified.

However, along with this slow process of liberalization followed in 1980s, the economy experienced macroeconomic imbalances in terms of deficits on both fiscal and balance of payments accounts. India's foreign debts and interest payments liabilities increased during the period. The Gulf War further stressed these problems by drastically raising the international oil prices. This led to India experiencing a severe fiscal and balance of payments crisis in 1990-91. The foreign exchange reserves of India amounted to even lower than $1 billion and were sufficient to pay for imports of only two weeks. In the face of this crisis, the government asked the International Monetary Fund (IMF) for support. The IMF suggested to follow the path of liberalization; introduce major economic reforms and also provided loans to help the Indian economy tide over this crisis situation.

3.2.2 Trade Policy Reforms

The Indian Government announced major economic reforms, especially trade reforms, in July 1991. Under these, the licensing requirements on industries were gradually reduced; non-tariff barriers on imports of intermediate and capital goods were removed; the export incentives were broadened and simplified; the export restrictions were removed; the tariff levels were reduced and the domestic currency was made fully convertible for foreign exchange transactions. The important policies followed in the industrial sector are summarized below under the broad categories of Tariffs, Non Tariffs Barriers and Exchange Rates. The reforms undertaken in the services sector are also subsequently discussed under the last category.

(a) Tariffs: There were high tariff rates in the pre liberalization period. In 1991, the average tariff rate and import coverage ratio were at 117 percent and 82 percent respectively (Kumar & Mishra, 2008). After 1991, a steady and substantial reduction in tariffs was undertaken. The maximum tariff rate was reduced from 150 percent in 1991 to 110 percent in 1992 and was dropped further to 45 percent by 1997-98. The average tariff also came down to around 35 percent by 1997-98. The peak tariff for the industrial products were also drastically reduced from 150 percent in 1992 to 10 percent in 2008.

According to Das (2016), the effective rate of protection (ERP), which is an alternative measure of import tariff, declined from 166 percent (1988-89) to 55 percent (1996-97) and it further came down to 20 percent (2009-10). The average ERP for the intermediate inputs, capital goods and consumer goods is given in Table 3.1.below, depicting the fall during the period of 1990-91 to 2009-10.

Table 3.1: Effective Rate of Protection in Indian Industries (%)

Industry groups	1990-91 to 1996-97	1997-98 to 2002-03	2003-04 to 2009-10
Intermediate inputs	95.7	35.5	14.8
Capital goods	61.7	29.9	12.1
Consumer goods	108.2	42.5	29.0

Source: Das (2016)

(b) Non Tariffs Barriers (NTBs): The non-tariff protection measures experienced a significant decline in post-1980 period. The export-import (EXIM policy) for the period of 1992–97 removed the licensing requirements for most intermediate and capital goods industries. The number of industries for which industrial licensing remained was reduced to 6 in 1998. For consumer goods industries, the licensing requirements remained till 2001. Thus, goods were allowed to be freely imported (import tariffs to be paid), apart from goods in the negative list (which anyways excluded most of the intermediate and capital goods). This led to elimination of many licensing procedures and discretionary decisions, experienced prior to these reforms (Goldar, 2002). The barriers to trade were further brought down by initiating a series of international negotiations with the 'Uruguay Round' of the WTO. Thus, the number of capital goods in Open General Licence category increased from 79 in 1976 to 1007 in 1987, 1170 in 1988, and 1329 in 1990. For intermediate goods, the OGL list had 620 items in 1987, and their number increased to 949 in 1988 (Panagariya, 2008).

The EXIM Policy of 1999-00, further added 957 goods to be imported freely and NTBs were applicable to only 2134 goods. The Government had been unilaterally liberalizing these imports as well and the last 715 goods were also freed of NTBs in the EXIM Policy 2001. The extent of decline in the non-tariff protection measures in different categories of industries can be seen from the decline in import coverage ratio (ICR). The decrease in the ICR for the capital goods was drastic and more pronounced than for the intermediate and consumer goods, as shown in Table 3.2 below for the period of 1990-91 to 2009-10.

Table 3.2: Import Coverage Ratio in Indian Industries (%)

Industry groups	1990-91 to 1996-97	1997-98 to 2002-03	2003-04 to 2009-10
Intermediate inputs	58.5	37.1	5.2
Capital goods	42.7	7.2	0.9
Consumer goods	66.5	36.9	5.1

Source: Das (2016)

(c) Exchange Rates: As part of the post-1991 economic reforms, in addition to direct measures of trade liberalization, the control over the exchange rate was gradually withdrawn. The IMF had observed that rupee was overvalued and this was an additional barrier to trade of goods and services. In 1991, the rupee was devalued against the US dollar by 20 percent. Another round of devaluation was carried out in 1992 and dual exchange rate mechanism was introduced, which effectively ended the exchange control of the government. It allowed open market sale and purchase of foreign exchange, within certain limit, by exporters and importers, for e.g. Exporters could sell 40 percent of their foreign currency to government and rest 60 percent in free market.

In 1993, the official exchange rate was merged with the market exchange rate to adopt flexible system of exchange rate. In 1994, by accepting the IMF Article VIII obligations, steps were taken for current account convertibility whereby other transactions were also allowed at market exchange rate such as business transactions, travel to foreign country and education / medical expenses. Due to better balance of payments situation and accumulation of foreign exchange reserves, in recent years, India has also been taking steps to achieve full convertibility at capital account (Panagariya, 2008).

(d) Services Sector Reforms: Services sector in India (major sectors being insurance, banking, telecommunication and infrastructure), traditionally had been subject to heavy government intervention. Along with trade liberalization, substantial liberalization of trade in services was also carried out in 1991. Many important steps have been taken to promote both private sector and foreign sector investment in the sector.

Insurance was not open to the private sector till 1999. To allow private and foreign investment in the sector, the Insurance Regulatory and Development Authority (IRDA) Bill was introduced. In this sector, FDI of up to 49 percent is now allowed by the government.

In the banking sector, the government allowed the operation of private banks after liberalization, though the sector is still dominated by the public banks. In the

private banks, 74 % of FDI is now permitted. A specified number of new branches are also allowed to be open by the foreign banks every year in India.

The opening up of telecommunication sector happened in 1994 with the National Telecommunications Policy. The New Telecom Policy was adopted in 1999, which brought major changes in the sector. In this policy, FDI of up to 49 percent is allowed in cellular mobile, paging and other satellite communications, after obtaining the licences from the Department of Telecommunications. For internet service, infrastructure providers, e-commerce and information technology, FDI of 100 percent is allowed (subject to conditions).

In the infrastructure sector, 100 percent FDI is permitted for construction of roads, highways, bridges, ports and airports. However, the railways still remain out of ambit of private investment (Panagariya, 2004).

3.2.4 Trade Performance

The changes in trade and exchange rate policies, as described above, led to changes in the structure and volumes of international trade. These developments are discussed in following three categories:

(a) Growth in Trade: The data available for the first five years of 1990s showed a significant increase in trade volumes. In 1980s, India's trade to GDP ratio was around 15 percent, which reached in 1995-96 to 24 percent. The share of merchandise trade in GDP rose from 28.2 percent in 2004-05 to 42 percent in 2013-14. India's share in world total exports and imports also rose to 1.7 percent and 2.5 percent respectively in 2013 from 0.7 percent and 0.8 percent in 2000 (Economic Survey, 2015).

India experienced rapid increase in exports during 1990s. It was during these years that the world trade too expanded significantly. During 1990-91 to 1995-96, the exports increased at annual rate of 12 percent which was much greater than the annual growth of world trade at 7.5 percent. This increased the share in global exports from 0.5 percent in the mid-1980s, to 0.8 percent in 2002 and to 1.7 percent in 2013. Thus, since liberalization reforms, exports of India are growing at a much faster rate than the global exports.

During the first decade of reforms (1993-94 to 2001-02), India's merchandise exports in dollars grew at around 8 percent per year. In stark contrast, however, for the period of 2002-03 to 20101-11, merchandise exports recorded an exceptionally high growth rate of 21 percent per annum. During the first decade, it took eight years to

double the value of exports from $23 billion in 1993-94 to $45 billion in 2001-02. However, in the second decade of reforms, the value of exports doubled in only four years from $45 billion in 2001-02 to $105 billion in 2005-06. The value more than doubled again in next five years to $250 billion in 2010-11, and it now stands at $314 billion in 2013-14. However, India's export sector is not independent of international demand shocks; the value of exports declined from $189 billion in 2008-09 to $182 billion in 2009-10, as a result of financial crisis of 2008. It recovered and recorded a high growth rate of 40 percent again in 2010-11 and 22 percent in 2011-12. (Veeramani, 2012)

India's imports grew at the rate of 9.75 percent per annum during 1990-91 to 1995-96. It continued to experience positive and high growth rate till 2004-05 and declined after that. By 2009-10, the growth rate of imports became negative due to international financial crisis. After recovering from this fall in 2010-11, merchandise imports increased to US$489.2 billion, recording 32.3 percent growth in 2011-12. The reason behind this was high imports growth of petroleum, oil and lubricants (POL) at 46.2 percent. POL imports have a share of around 30 percent in India's total imports. Non POL imports grew at the rate of 26.7 percent. Also, gold and silver imports (second important component of imports with share of around 12 percent) increased by 44.5 percent in the year 2011-12.

The table 3.3 below provides the annual rate of growth of both exports and imports of India since 1991. The period 1990-91 to 1995-96 recorded a higher growth in India's exports (12 percent per annum) than in India's imports (9.75 percent per annum), thus leading to decline of India's trade deficits from around US $ 5-6 billion per annum in 1980s to 2.3 billion in 1994-95. During 1995-96, India's exports and imports increased leading to reappearance of trade deficit of the magnitude of around US$ 5.4 billion (Mehta, 1997). Trade deficit reached a high level in 2011-12 at US$ 185 billion, with the highest growth rate of 55.6 percent since 1950-51. The current account deficit to GDP also reached a high level of 4.2 percent. The main contributing factors for such increase were moderate growth in exports accompanied by high growth in imports mainly on account of POL and gold and silver imports. Since then, both exports and imports are showing modest rate of increase and for the year 2013-14, imports experience a negative rate of growth, which is then leading to rising reduction in trade deficit for the last year. The figure 3.1 below traces the trend in exports, imports and trade deficit of Indian economy since 1991-92.

The services export growth in India of 23.6 percent has been much faster than merchandise exports of 21.4 percent for the period of 2000-01 to 2011-12. However, due to the uncertainty in the global economy, services exports have been growing erratically. It experienced a lower growth of 14 percent in 2011-12 as compared to growth of 29.8 percent in the previous year. Services imports declined by 2.9 percent in 2011-12, as compared to increase of 34.2 percent in 2010-11. The decline emerged largely due to negative growth rate of -47.5 and -4.4 percent of software and business services respectively.

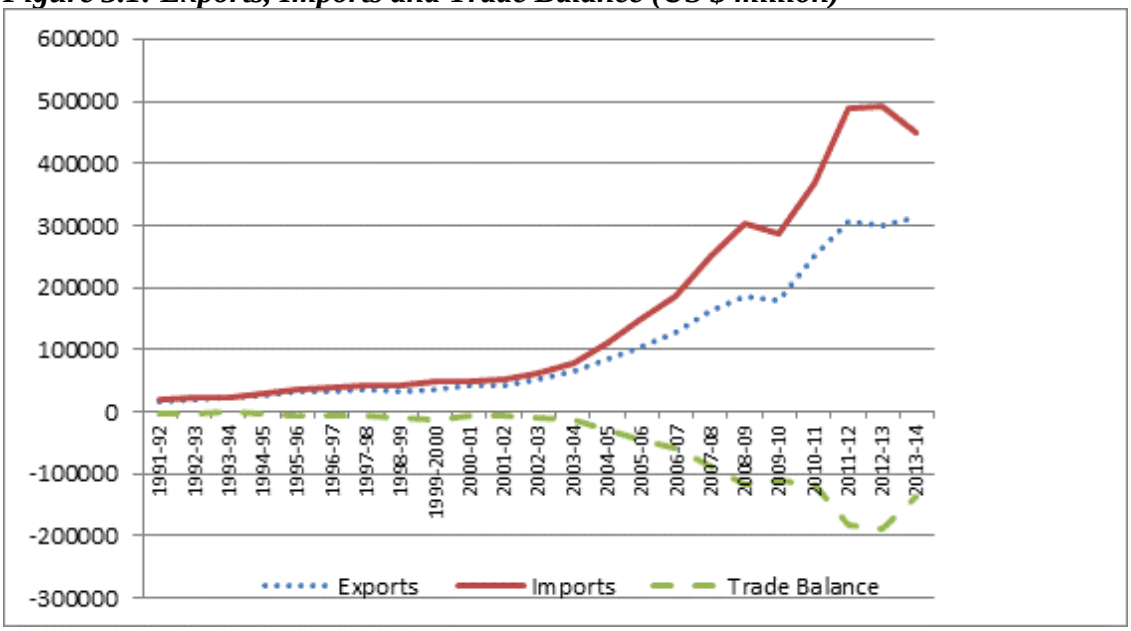
Services sector has been experiencing surplus on its trade balance, which helps a long way to cover part of the merchandise trade deficit. It covered around 38 percent of deficit in merchandise trade during 2006-07 to 2011-12. There is a risk of services exports going down due to global economic conditions, which would make it difficult for India to finance its increasing merchandise trade deficits and is a cause of concern (Economic Survey, 2013).

Table 3.3: Growth Rate of Exports and Imports (%)

Year	Exports	Imports
1991-92	-1.5	-19.4
1992-93	3.8	12.7
1993-94	20	6.5
1994-95	18.4	22.9
1995-96	20.8	28
1996-97	5.3	6.7
1997-98	4.6	6
1998-99	-5.1	2.2
1999-2000	10.5	17.3
2000-01	20	0.5
2001-02	-0.6	2.9
2002-03	20.3	19.4
2003-04	21.1	27.3
2004-05	30.8	42.7
2005-06	23.4	33.8
2006-07	22.6	24.5
2007-08	29	35.5
2008-09	13.6	20.7
2009-10	-3.5	-5
2010-11	40.5	28.2
2011-12	21.8	32.3
2012-13	-1.8	0.3
2013-14	4.7	-8.3

Source: Economic Survey (2015-16)

Figure 3.1: Exports, Imports and Trade Balance (US $ million)



Source: Data from Economic Survey (2015-16)

(b) Composition of Trade: At a relatively broad level of aggregation, the commodity composition of trade in India has not changed much. The share of primary products in India's exports reduced slightly from 2000-01 to 2010-11, but regained in 2013-14, mainly due to rise in agricultural products exports (Table 3.4). The manufacturing exports share in merchandise exports was constant at around 75 percent for the period 1992 – 02 and fell drastically to 64 percent in 2013-14. The capital- or skilled-labour-intensive sectors had been growing faster than the average growth rate of the merchandise exports, such as chemicals and engineering products. The unskilled-labour-intensive sectors had been growing maximum at the average rate of merchandise exports, such as growth in leather exports is below and growth in readymade garments, textiles, and fabrics is approximately same as the average rate of growth of total merchandise exports (Panagariya, 2004).

This has been the most striking aspect of the structural change in India's exports. The proportion of capital-intensive products in exports more than doubled between 1993 and 2010 from 25% to around 54%. On the other hand, for the same period, the proportion of unskilled labour-intensive products declined from 30% to 15%. This bias in export basket is ironic as India's true comparative advantage lies in semiskilled labour-intensive activities (Veeramani, 2012). The share of petroleum products in India's total exports increased drastically from about 2 percent in 1993-94 to as high as 21 percent in 2013-14. This increase is largely due to high exports mainly by India's

private sector oil refineries. It has been observed that the export bundle of India is becoming increasingly more similar to that of more developed countries of Organisation for Economic Cooperation and Development (OECD).

Table 3.4: Composition of Exports (%)

	2000-01	**2005-06**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Agriculture & allied products	16	15.4	9.7	12.4	13.6	13.7
Manufactured goods	78.8	72	69	66.1	63.4	63.5
Crude & Petroleum Products (incl coal)	4.3	11.5	16.8	18.7	20.6	20.6

Source: Various Economic Surveys

India is also experiencing a high degree of concentration in export activity. This can be measured by using the Hirschman-Herfindahl (HH) Index whose value lies between 0 and 1; higher value denoting concentration of exports in few products. Veeramani (2012) calculated the HH index and found to be significantly increasing from 0.3 to 0.6 during the period of 2004 – 10. It was inferred that an important cause of this increase is the rising share of petroleum products exports and hence HH index was recomputed after eliminating the influence of petroleum products by dropping their export values. These recomputed values showed some definite improvement in India's export diversification but still indicate a high degree of concentration in export basket.

India's composition of imports changed in recent years, as shown in table 3.5 below. The share of food and allied products is static at around 3 percent since 2000-01. The share of POL imports declined from 31.3 percent in 2000-01 to 28.7 percent in 2010-11, but increased sharply next year and reached to 37 percent in 2013-14. The proportion of gold and silver imports rose from 9.3 to 12.6 percent during 2000-01 to 2011-12. Another important development was observed in the capital goods sector whose share in imports dropped sharply in 1990s but started increasing in 2000s and reached 13.3 percent in 2011-12.

Table 3.5: Composition of Imports (%)

	2000-01	**2005-06**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Food & allied products	3.3	2.5	2.9	3	3.4	3.2
POL	31.3	29.5	28.7	31.7	33.4	36.6
Capital goods	10.5	15.8	13.8	13.3	12.8	12.1
Gold & Silver	9.3	7.6	11.5	12.6	11.4	7.4

Source: Various Economic Surveys

(c) Direction of Trade: India' markets for exports and imports have diversified overtime. The share of Europe and America in exports have been declining whereas share of Asia and Africa have been increasing (Refer Table 3.6 below). Within Asia, there has been a shift from developed countries like Russia and Japan towards developing countries such as China and United Arab Emirates (UAE). The share of Japan fell to 2.2 percent and that of Russia to 0.6 percent in 2010. In contrast, the share of China increased from 3.1 percent to 8.1 percent and that of UAE from 5.4 percent to 12.7 percent from 2002 to 2010. But, it is also inferred that some of the export growth to UAE may represent transit trade to Pakistan. The share of the United States (U.S.) though remained steady from 1993 to 2002 and increased little from 18.5 percent to 21.3 percent but declined sharply after that to reach 11 percent in 2010 (Veeramani, 2012).

Table 3.6: Region-wise Share of India's Exports (%)

	2000-01	**2005-06**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Europe	25.9	24.2	19.9	19	18.7	18.6
Africa	5.3	6.8	7.8	8.1	9.7	9.9
America	24.7	20.7	14.7	16.4	17.8	17.2
Asia	37.4	46.9	50.7	50	50.8	49.4
CIS & Baltics	2.3	1.2	1.1	1.0	1.2	1.1

Source: Various Economic Surveys

India's imports also shifted towards developing countries from the earlier dominant countries such as Russia and OECD. The share of Europe in total imports fell from 27.6 percent of the total imports in 2000-01 to 16 percent in 2013-14, whereas Asia's share rose from 27.7 percent to 61 percent in the same period. For the same period, the share of U.S. increased from 7.9 to 12.8 percent. The top three trading countries are China, UAE and U.S., with their rankings changing on a yearly basis.

Table 3.7: Region-wise Share of India's Imports (%)

	2005-06	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Europe	21.7	19.2	18.7	17.8	15.8
Africa	7.03	8.6	8.8	8.4	8.1
America	7.8	9.8	9.1	12.1	12.8
Asia	60.5	59.6	60.8	59.6	60.7
CIS & Baltics	2.03	1.5	1.7	1.6	1.7

Source: Various Economic Surveys.

3.3 Construction of Trade Openness Measure at State Level

There are various measures of trade openness, which can be broadly classified into two categories:

(a) Policy measures or what are also called as the ex-ante measures, include tariffs and non-tariff barriers. There are various measures of tariff protection on a product such as nominal tariff rate; average tariff rate; ERP.

Non-tariff barriers consist of all barriers to trade other than tariffs. These can be in the form of qualitative restrictions like industrial quality control, customs clearance procedure etc. or quantitative restrictions like import quotas, voluntary export restraints etc. Because of the nature of NTBs, they are more difficult to measure and compare across time than tariffs. But generally NTBs coverage ratios have been found to be highly correlated with tariffs.

The measure of openness of the economy based on policy measures suffers from various limitations such as, it takes simple average of data, without capturing the relative weightage of different categories of goods and that NTBs are difficult to measure. In addition, policy measures for trade protection in the services sector are not available for all countries (Berg & Krueger, 2003). Goldberg & Pavcnik (2004) however, argue for the policy measures. According to them, the policy measures based on tariffs are comparable across time and also show cross industry variation during trade reforms. Also, they argue that the usual endogeneity concern for trade protection is not a big problem for countries that liberalized after becoming WTO members. The tariffs reductions undertaken in those countries were more to comply with decisions of WTO than to meet any other economic goals.

(b) Outcome measures also called as the ex-post measures include trade-GDP ratio, export-orientation, and import-penetration, which are actual realizations of the 'policy-based' measures of trade liberalization. The shortcoming of using the two measures - exports share and imports share in GDP – at the same time, is that both exports and imports are determined simultaneously as a consequence of fall in trade barriers. The measure of trade openness most largely used in empirical analysis hence, is the share of exports and imports in GDP, usually referred to as measure of (trade) openness.

These measures have the advantage that they reflect the actual exposure to international trade and are easily quantifiable for an economy. Policy based measures may not ensure the realization of the expected outcomes in the ex-post scenario. Other advantages are that they capture realized outcomes, are easily measurable and take into

account the effects of all trade liberalization policies followed in the economy. These measures however, suffer from limitations such as they are likely to reflect other determinants of trade also and not only stance of trade policy. The exports and imports can vary due to other factors such as shocks to economy, changes in tastes and preferences, rainfall and other geographic attributes without any change in the trade policy. In addition, increase in share of trade to GDP may also result from better growth performance (which may or may not be due to trade reforms). Thus, use of trade volumes along with other macroeconomic variables in empirical studies would lead to potentially serious simultaneity bias in the interpretation of their results (Goldberg & Pavcnik, 2004).

3.3.1 Available Measures of Calculating Trade Openness of States

To arrive at measure of trade openness at sub national level, studies have adopted different formulations of policy and outcome measures of trade openness.

1. Policy Measures: The trade policy variables at sub national level were used by Topalova (2005), Hasan et.al. (2007) & Cain et.al. (2010 b) in their studies looking at impact of trade openness on poverty, inequality and unemployment in India. They constructed state (or district)-level protection measures for state and their rural and urban sectors. The tariffs and non-tariff barriers for the states are calculated by taking tariff rates and NTB coverage rates for industries and weighing them by employment share of states and sectors:

$$Tariff_{it}^{j} = \Sigma_{km}\, \gamma_{ikm}^{j} * Ind\_Tariff_{kmt}$$

$$NTB_{it}^{j} = \Sigma_{km}\, \gamma_{ikm}^{j} * Ind\_NTB_{kmt}$$

where $Tariff_{it}^{j}$ is tariff for the period t for the sector j (rural or urban) of state i; NTB_{it}^{j} is measure of non-tariff barriers for the period t for the sector j (rural or urban) of state i; γ_{ikm}^{j} is the share of employment of industry k_m in sector j of state i. Ind_Tariff_{kmt} and Ind_NTB_{kmt} are non-tariff coverage rates for the industries.

Hasan et al. (2007) and Cain et.al (2010b) arrived at the state level measure of trade openness whereas, Topalova (2005) calculated it for the districts.

2. Output Measures: There are various formulations in literature to measure the trade values at state level from national level figures.

a) State Level Export Orientation: Export-orientation of individual states in India was reported in UNCTAD (2013) for the year 2005-06. This was estimated by first constructing industry-level shares of exports in a state by using the following formula.

The export orientation of each state is then calculated as the share of estimated state's exports in India's total exports.

$$X_i = \left[\sum_{l=1}^{L} \frac{Y_{il}}{Y_l} * X_l\right]$$

where X_i = State i's exports; Y_{il} = State's i's output in industry l; L = total number of industries; Y_l = Total output of industry l; X_l = Total exports of industry l. It is assumed that the share of a state in total exports of industry 'l' is same as its share in total output of industry 'l'.

Data from the Annual Survey of Industries (ASI) was used to estimate the output of industries. The trade data in India is available at product level, while data for output is available at industry level. A concordance matrix was constructed between Harmonized Commodity Description and Coding System (HS) of 2002 at six digit product level classification, at which trade data is available and three-digit level industrial data at National Industrial Classification (NIC), at which output data is available. This concordance matrix has been used to arrive at the exports of each industry at the three-digit level in a state.

b) Economic Survey data on state level exports: The Economic Survey 2007-08 provided figures for exports by state of origin for 15 key states for the first time. It was continued till 2011-12 and stopped after that. This data is thus, available only for the period of 2005-06 to 2011-12. The source of this data is Directorate General of Commercial Intelligence & Statistics (DGCI&S) and has been compiled from "state of origin of export goods" as recorded in Daily Trade Returns (DTRs) by the customs.

According to Economic Survey 2011-12, there are many shortcomings in the data which need to be rectified for the data improvement and reliability. The figures are not validated at DGCI&S end and are collected as per the records from customs only. The exporter can give only one code for state of origin in a single bill and therefore, there is no facility for making different entries for invoices of items originating from multiple states. In the DTRs of the customs, there is considerable number of cases where state of origin is not reported. It has been observed that the exporters tend to report the 'state of origin' as the exporting state or the state to which the good belongs or the state from where goods are procured. In case of non-manufacturing exporters, this problem is more acute as the exporters are aware of only the place of procurement and not the place where goods are produced.

c) State Openness Index: This approach followed by Marjit & Kar (2008) constructs openness index for the Indian states using import and export shares of industry in total exports and imports and by finding rank correlation between output shares and import and export shares of states. The approach firstly calculates the value added share of industries for each year:

$$s_{it}^{k} = GVA_{it}^{k} / TVA_{t}^{k}, \quad t = 1980\text{-}81, \ldots., 2002\text{-}03,$$

where s_{it}^{k} = production share of industry 'i', in state 'k', at time 't'; GVA_{it}^{k} = Gross Value Added of of industry 'i', in state 'k', at time 't'; TVA_{t}^{k} = Total of all gross value added of industries in state k. This is calculated for 15 major states of India at 2 digit level of NIC. The study incorporates agricultural and manufacturing goods based on NIC 1998.

The share of these products in total exports (x_{it}) and imports (m_{it}) of India is then calculated for all the years. The trade data is taken from DGCI&S and it requires concordance to be done with the ASI classification from where the output data is taken.

The correlation coefficients of x_{it} with s_{it}^{k} (named as Rx_{t}^{k}) and m_{it} with s_{it}^{k} (named as R_{mt}^{k}) are calculated for all the years. The states are then ranked, according to the value of correlation coefficient, in descending order. Higher the ranks, higher is the export and import performance of the state.

The trade openness index is calculated by assigning weight of half to the ranks Rx_{t}^{k} (the export rank) and the inverse R_{mt}^{k} (the import rank) i.e $O_{t}^{k} = ½ (Rx_{t}^{k} + \text{inverse } R_{mt}^{k})$. In case of import, inverse ranking is followed. Finally, ranking of the openness index is done by giving lowest rank to the highest score. Hence, the lower value of the index implies greater openness.

One of the limitations of this index is that it is rudimentary and not a very refined measure of trade openness. Also, the weights assigned are arbitrarily decided to be 0.5 for exports and imports at each state level, which are also amenable to alterations.
d) Estimation of State-Wise Trade Data Series: This is given by Barua & Chakraborty (2010). This study attempts to estimate exports and imports of the states from national nominal values of exports and imports. The trade data is taken from Centre for Monitoring the Indian Economy (CMIE) and DGCI&S for the period of 1990-91 to 1999-2000. The study uses for the period of 1990-91 to 1999-2000.

The trade data based on the HS Code classification ranging from 01 to 99 has been classified into two groups: (a) 01–24 (agricultural products) and (b) 25–99

(manufacturing products). The method for calculation of exports for states (X_i) is same as is followed in UNCTAD (2013).

The imports of manufacturing (agricultural) items for each state was estimated as follows.

$$M_i = \sum_l [M_l / P * P_i] \qquad l = 1 \text{ and } 2$$

where M_i = Imports of state i; M_l = Imports of industry l (l=1 is agriculture and l = 2 is manufacturing); P = Total population of India; P_i = Population of state i. This method assumes the homothetic preferences for imports for all states.

The export and import values for states ($X_i + M_i$) were added to calculate total trade of states. The trade openness measures taken were - trade balance, exports, and manufacturing trade as a percentage of NSDP of states.

It is not possible to use the available measures of state level trade openness due to various limitations. Firstly, these measures are calculated for only 15 major states of India whereas the present study takes 21 states of India under consideration. Secondly, UNCTAD (2013) provides the export figures for only one year i.e. 2005-06 and does not provide the data for imports of the states. The Economic Survey data on state level exports is available for the period of 2005-06 to 2011-12 and it also does not provide data for imports of the states. The trade openness measure of Barua & Chakraborty (2010) is not available in the published text and the state openness measure of Marjit & Kar (2008) is a rank measure. The available measures, thus are either not available for the period under study (1993-94 to 2011-12) or are not the estimates of the nominal value of both exports and imports at the state level. Hence, it is required to estimate trade openness measure separately for the empirical analysis of this study and methodology for the same is discussed below.

3.3.2 Methodology for Measurement of Trade Openness of States

An attempt has been made to estimate the exports and imports in nominal terms for 21 major states of India.

(1) States' Exports: To calculate the exports of each state, the formula given in UNCTAD (2013) and Barua & Chakraborty (2010) is followed. The data for state's output in different industries and total output are taken from Central Statistical Organization (CSO) and data for exports of India is taken from United Nations Commodity Trade Statistics database (UNCOMTRADE).

CSO classifies the national accounts data in broad classification of Agriculture and Allied and Industry in the following sub heads. The Services sector is not taken into account as the study focusses only on the merchandise trade.

(i) Agriculture and Allied comprises of (a) Agriculture, (b) Forestry & Logging and (c) Fishing

(ii) Industry comprises of (a) Mining & quarrying, (b) Manufacturing, (c) Construction and (d) Electricity, Gas & Water supply

These sub heads, except Construction (as no trading happens in this industry), are used in the calculation. The CSO collects and presents data according to NIC, which is an adaptation of International Standard Industrial Classification (ISIC) of United Nations. The data for trade has been collected from World Integrated Trade Solutions (WITS), which provides UNCOMTRADE data at ISIC classification. The industries for which data has been utilized with the corresponding two digit industry codes of ISIC (given in brackets) are: (i) Agriculture (01); (ii) Forestry & Logging (02); (iii) Fishing (05); (iv) Mining & Quarrying (10 + 11 + 12 + 13 + 14); (v) Manufacturing (15 to 36) and (vi) Electricity, Gas & Water Supply (40).

(2) States' Imports: The methodology given in Barua & Charaborty (2010) is modified a little to calculate the value of imports for each state. The total imports of the country are divided across states in accordance of the weight given by share of GSDP in total GDP of the economy for that period, to arrive at the imports of each state.

$$M_i = \sum_l [M_l * Y_i / Y] \qquad i = 1 \text{ to } 21 \text{ and } l = 1 \text{ to } 6$$

where M_i = Imports of state i; M_l = Imports of industry l (six industries given above); Y_i = GSDP at constant prices of state i; Y = GDP at constant prices of India.

Barua & Chakraborty (op. cit) used the population share of state as weights, in place of GSDP share as weights, used here. Their calculation assumed homothetic preference for imports for the states. However, according to the macro-economic theory, imports are a positive function of income. The studies have also largely linked magnitude of imports to the size of the economy (Kumar, 2001).

These estimated figures of exports (X_i) and imports (M_i) are added to calculate the percentage share of total trade balance in NSDP of the state and is the measure of trade openness used in the present study.

The study incorporates outcome measures of trade openness as these are ex post measures and enable to evaluate the actual levels of international trade by an economy.

Also, measuring the actual exports and imports of the country take into account effects of all trade liberalization policies followed. However, it still suffers from an important limitation that trade openness measure for states had to be estimated based on restrictive assumptions, as actual data is not available.

3.4 Descriptive Statistics of Trade Openness of States

The table 3.8 below gives the calculated trade balance as percentage of NSDP and table 3.9 gives the calculated exports and imports as percentage of NSDP for 21 states under consideration. The trade balance is increasing over the years, with the higher rate of growth between 2004-05 and 2009-10 and between 2009-10 and 2011-12. The states experiencing higher trade balance percentages are Goa, Gujarat and Jharkhand. This increase is largely attributed to relatively high exports as percentage of NSDP estimated for these states. The imports as percentage of NSDP are not very different across states, as is shown by relatively much lower values of standard deviation for all the years. Thus, exports are driving the differences in trade balance across states.

All the states except Chhattisgarh and Rajasthan experience a positive rate of growth of exports from 2009-10 to 2011-12. Imports of all the states for all the periods show a positive and high rate of growth. The state wise data show clear domination of Maharashtra and Gujarat as the highest exporting states, followed by Tamil Nadu and Uttar Pradesh. The highest importing state is Maharashtra (import share much higher than other states), followed by Uttar Pradesh, Uttaranchal, Andhra Pradesh and Gujarat.

Table 3.8: Trade Balance (% of NSDP) of the States

State	1993-94	1999-00	2004-05	2009-10	2011-12
Andhra Pradesh	18.3	21.4	27.3	34.3	44.2
Assam	16.5	18.6	28.2	32.7	39.3
Bihar	13.2	17.8	21.7	26.4	32.3
Chhattisgarh	23.2	24.0	38.3	44.7	47.9
Delhi	18.2	19.1	20.9	27.5	33.4
Goa	25.1	30.5	42.2	45.5	64.8
Gujarat	26.1	34.1	41.0	55.1	63.1
Haryana	20.6	25.3	33.4	36.5	44.8
Himachal Pradesh	15.1	21.2	26.6	42.7	55.3
Jharkhand	27.8	31.3	46.1	48.4	64.0
Karnataka	19.6	22.3	31.5	39.1	46.0
Kerala	16.1	19.6	24.1	31.3	39.4
Madhya Pradesh	17.7	21.3	27.6	37.3	43.7
Maharashtra	23.0	26.4	32.9	43.6	51.6
Orissa	17.4	20.6	29.2	40.6	49.7
Punjab	18.3	22.5	29.4	39.3	49.7
Rajasthan	17.4	21.8	27.9	36.4	38.9
Tamil Nadu	23.7	25.4	32.6	41.9	51.8
Uttar Pradesh	17.9	21.9	28.4	34.8	44.1
Uttaranchal	18.0	19.8	27.1	45.5	58.6
West Bengal	19.0	19.2	25.7	32.7	37.9
Min	13.2	17.8	20.9	26.4	32.3
Max	27.8	34.1	46.1	55.1	64.8
Average	19.6	23.0	30.6	38.9	47.6
Standard Deviation (SD)	3.7	4.3	6.4	6.9	9.3

Source: Author's own calculation.

Table 3.9: Exports and Imports (% of NSDP) of the States

	Exports					Imports				
State	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
Andhra Pradesh	8.8	8.5	10.9	12.2	16.9	9.5	12.8	16.5	22.1	27.3
Assam	6.9	6.0	11.5	10.1	11.5	9.5	12.6	16.7	22.6	27.7
Bihar	3.9	5.2	5.3	5.3	7.4	9.3	12.6	16.3	21.1	24.9
Chhattisgarh	13.3	10.7	21.2	21.3	20.0	9.9	13.2	17.0	23.4	27.8
Delhi	8.8	6.6	5.3	4.8	5.9	9.4	12.5	15.6	22.7	27.6
Goa	14.9	17.4	25.2	24.4	30.3	10.2	13.2	17.0	21.1	34.5
Gujarat	16.3	20.3	23.6	30.2	33.0	9.8	13.8	17.4	24.8	30.1
Haryana	10.9	12.7	17.1	15.9	19.5	9.7	12.6	16.4	20.6	25.3
Himachal Pradesh	5.6	8.1	9.9	17.4	23.5	9.5	13.1	16.7	25.3	31.9
Jharkhand	17.6	18.2	29.5	23.9	32.6	10.2	13.2	16.6	24.5	31.4
Karnataka	10.2	9.3	15.0	16.4	18.7	9.4	13.0	16.5	22.7	27.2
Kerala	6.7	6.6	7.4	7.5	9.7	9.4	13.1	16.8	23.8	29.7
Madhya Pradesh	8.2	8.5	10.9	14.4	15.8	9.5	12.8	16.7	22.9	27.8
Maharashtra	13.6	13.2	16.4	19.7	22.9	9.4	13.2	16.5	23.9	28.7
Orissa	7.7	7.6	12.4	17.0	20.7	9.7	13.0	16.8	23.5	29.0
Punjab	8.9	9.8	12.8	17.6	22.7	9.5	12.7	16.6	21.7	27.0
Rajasthan	7.8	8.9	11.2	14.4	14.4	9.6	12.9	16.7	22.0	24.5
Tamil Nadu	14.3	12.4	15.9	19.0	23.4	9.4	13.0	16.7	22.9	28.5
Uttar Pradesh	8.3	8.9	11.7	12.9	16.5	9.6	12.9	16.6	21.9	27.5
Uttaranchal	8.6	6.7	10.7	22.7	30.4	9.4	13.1	16.4	22.8	28.3
West Bengal	9.7	6.7	9.5	10.4	11.7	9.4	12.5	16.2	22.2	26.3
Min	3.9	5.2	5.3	4.8	5.9	9.3	12.5	15.6	20.6	24.5
Max	17.6	20.3	29.5	30.2	33.0	10.2	13.8	17.4	25.3	34.5
Average	10.0	10.1	14.0	16.1	19.4	9.6	12.9	16.6	22.8	28.2
SD	3.5	4.1	6.2	6.3	7.7	0.2	0.3	0.3	1.2	2.3

Source: Author's own calculation.

3.5 Concepts, Measures and Extent of Poverty and Inequality

Poverty is a condition when people are not able to attain a 'minimum' level of well-being. This 'minimum' level is partially determined by the prevailing standards of society and economy. However, there are few dimensions of well-being which are based on other factors like nutritional requirement which in turn, is based on absolute biological minimum. Traditionally, poverty was defined in monetary terms i.e. insufficient income or consumption. Later, the definition was broadened to also include

insufficiency of health, nutrition, and literacy, and psychological impacts as insecurity, low self-esteem and powerlessness. Hence, poverty is a complex and multidimensional problem, and there is considerable debate in the literature regarding its definition and measurement (Ravallion, 2003).

There are various concepts of poverty and various ways of measuring poverty. The poverty line, which is a debatable issue, is also required for the measurement of poverty. These are discussed in section 3.5.1. The issues pertaining to calculation of poverty in India are discussed in the next section 3.5.2. Section 3.5.3 discusses the level and extent of poverty in India, at the national and state level. The discussion on poverty is incomplete without bringing in the situation of inequality in a country. Hence, last section of 3.5.4 presents and discusses the trends of inequality in India.

3.5.1 Concepts and Measures of Poverty

(a) Absolute and Relative Poverty:

Poverty as a concept was initially defined narrowly in terms of per capita income or expenditure falling below a specified poverty line. Two concepts of absolute and relative poverty arise from this definition. Absolute poverty is calculated by taking poverty line that has fixed purchasing power defined to meet basic needs of households. Relative poverty is calculated from the poverty lines defined on the basis of income or consumption distribution in an economy. This would mean that the poverty line represents greater purchasing power in richer countries. Since large proportion of population of developing countries are at maximum able to satisfy basic minimum needs, there is more reliance on absolute poverty than relative poverty for research and policy analysis.

(b) Transitory and Chronic Poverty:

The poverty can be grouped into two sub categories – transitory poverty and chronic poverty – depending on the duration households spend being in poverty. People who become poor for a short duration of time and then move out of poverty are called transitory poor. Chronic poor are people who remain in poverty for a large part of their lives and may also pass their poverty onto their children. The calculation of transitory and chronic poverty requires either the use of certain qualitative approaches or the panel data that tracks the households over time. The approach has been followed by Dhamija & Bhide (2009) to study the extent of chronic poverty in India and the factors affecting

it. This has not been used frequently, especially in the Indian literature, as most empirical analysis is based on NSSO estimates, which are not panel in nature.

(c) Vulnerability:

Vulnerability is defined as the probability or risk of being in poverty today or of falling into deeper poverty tomorrow. It is an important aspect of individuals' welfare as it affects their behaviour and perception in the society and economy. The anticipation of changes in income or consumption and their realizations are important to households and individuals and thus measuring vulnerability is important for poverty alleviation. Various factors at different levels can affect the vulnerability of population to poverty. At the household level, there can be illness or death; at the community level, pollution or riots can increase the risk; and at the national level, calamities or other economic shocks can affect the population at large. Others can be related to characteristics of certain groups (household level factors) such as workers with limited or no assets would be more susceptible to such adversity. Different types of interventions, hence, would be required to address these various factors contributing to vulnerability (Jha, 2002).

It is very difficult to measure vulnerability; both risk of becoming poor today or probability of getting poorer tomorrow. Vulnerability is measured in various ways; firstly, movement in and out of poverty i.e. probability of entry and exit from poverty. Secondly, if data is available for more number of years than two, it becomes possible to categorize households as transient poor, chronic poor or persistent poor, depending on the time and frequency of their poverty spells, which then determine their vulnerability. Thirdly, income / consumption variability is also used as a proxy for vulnerability. If a group of households, experience low income variability and on an average remain slightly below the poverty line, may be considered to be non-vulnerable. In contrast, a group of households may be considered vulnerable, if on average they are just above the poverty line but have high income variability.

(d) Choosing and Estimating Poverty Line: One important aspect of calculating poverty levels in a country is to define a poverty line. Poverty line is the threshold that divides the population into poor and non-poor. The definition of poverty line depends upon the indicator of well-being used for the measurement of poverty. Thus, poverty line can be either monetary defined at consumption / income levels or non-monetary defined on other factors as ownership of assets, literacy, education etc. Poverty line typically denotes the minimum income or consumption level required to meet basic needs of the households.

Since 1990, the World Bank has been using poverty lines at $1 and $2 a day for low income countries. 'Dollar a day' line has a more widespread use to measure global poverty. This poverty line is then converted to domestic currency using the Purchasing Power Parity (PPP) exchange rates. The international poverty line is then converted in local currency using the local consumer price indices for the period under consideration. This poverty line provides the same reference point for the international comparison of poverty levels of different countries.

There are two broad limitations of drawing a poverty line. Firstly, defining a poverty line always implies an approximate and arbitrary division between poor and non-poor, which is debatable. It is important to choose poverty line which is understood and accepted by the people of the country, as representing the 'basic minimum needs'. Secondly, in many countries a high percentage of population would lie near the poverty line. A very small adjustment of the poverty line would make sharp changes in the calculation of poverty. This would have important implications for policies followed in a country.

(e) Income/Consumption Expenditure Poverty - Narrow Measure:

The economic literature largely takes per capita consumption expenditure or income as a base for calculation of poverty. So, after defining a poverty line in terms of monetary values of absolute income or consumption, household sample surveys are used to calculate different measures of poverty. The most widely used measures are Foster Greer Thorbecke (FGT) measures defined as follows (Foster, Greer & Thorbecke, 1984):

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^\alpha$$

where N = population size; q = poor population; y_i = real monthly per capita expenditure of the i^{th} household; z = poverty line and α = poverty aversion parameter.

The simple measure is the Head Count Ratio (HCR; $\alpha = 0$) which calculates the proportion of population below the poverty line. It is a measure of absolute poverty incidence. The Poverty Gap Index (PGI; $\alpha = 1$) measures the depth of poverty and calculates the shortfall of the average aggregate income or consumption relative to the poverty line across the population. The Squared Poverty Gap Index (SPGI; $\alpha = 2$), is the corresponding mean of the squared proportionate poverty gaps and measures the severity of poverty in a country. This measure calculates the distance of households

from the poverty line and puts higher weight on households that are located further away from the poverty line.

One important issue is that the income or consumption measures of poverty are measured at the household level and hence are not able to calculate poverty at the intra-household level. Secondly, the calculation of poverty requires the specification of poverty line, which as stated above, is unarguably arbitrary. A small adjustment in definition of poverty line can drastically alter the poverty incidence estimates of a country. This can be tackled through carrying out sensitivity tests (i.e. running FGT calculations on different poverty lines) and by also studying the three measures jointly for poverty analysis.

These issues though important, do not undermine the importance of income / consumption expenditure measures of poverty. The measures still remain indispensable for calculating and comparing levels of both intra and inter country poverty and monitoring changes over time. However, the limitations lead to the recognition that in order to frame special targeted policies for poverty alleviation, the other definitions and measures of poverty need to be looked at, along with poverty line-based analysis.

(f) Multidimensional Poverty - Broad Measure:

In the 1970s and 1980s, there was an emphasis that income or expenditure are only means to achieve the fundamental requirements of human well-being i.e. health, education and literacy. Based on Sen's "capabilities and functionings" framework, there was a tendency towards a 'basic needs' approach in the concept of poverty. According to this approach the freedom of a person to choose her functionings is what is important and it requires a minimum level of well-being. This minimum level of well-being can be attained by some factors such as, personal, social and environmental factors. It is also dependent on the public provision of few important goods and services, not included in monetary measures of income or expenditure. Therefore, income / consumption expenditure are not sufficient for measuring the well-being of households and factors such as housing, literacy, life expectancy, provision of public goods are required to be added in the broad measure of poverty.

Thus, going beyond the notion of economic well-being embedded in the traditional approaches of income or consumption expenditure, these broader conceptualizations are increasingly defining human well-being in multidimensional terms (Alkire, 2002 and Sen, 1999). This has widened the breadth and depth of poverty research incorporating more comprehensive conceptualizations. The analysis of

multidimensional poverty requires the choice of an index to measure it. There are various multidimensional indices of poverty that have been proposed in the last few years, more widely used being, Alkire & Foster (2007) and Bourguignon & Chakravarty (2003).

3.5.2 Estimation of Poverty: Issues with Respect to India

In India, the basic minimum needs approach gained prominence for the first time in early 1970s. A Task Force was appointed by the Planning Commission in 1979 with a recommendation to define poverty line based on the national minimum standard that would provide a household of average size and composition, calories recommended by nutrition experts for a healthy active life, along with a reasonable level of essential non-food items. Taking the minimum calorie requirements and some minimum non-food requirements (clothing, shelter etc.) as a base, the minimum required subsistence income levels were determined for rural and urban areas respectively at monthly per capita expenditure of Rs. 49 and Rs. 57. This led to evolution of poverty measurement in India to the basic needs based approach, though it still remained in the consumption metric (Vaidyanathan, 2013). These poverty lines were also later recommended by the Expert Group on Estimation of Proportion and Number of Poor, also called as Lakdawala Committee Report (Government of India, 1993). The procedure developed by them was adopted in 1997. The expert group used the calorie norms only as a peg to derive minimum per capita consumption expenditure with which to measure consumption poverty.

Once all-India poverty lines were fixed using calorie norms for 1973-74, all further adjustments were only for variations in cost of living across states and over time. This was done in two ways. First, state-and sector-specific poverty lines for 1973-74 were calculated using the price indices for the states and their sectors for the same year. This would capture the interstate price differential as existed in the base year period of 1973-74 for calculation of poverty line. Second, these poverty lines were updated for subsequent years using Consumer Price Index of Agricultural Labourers (CPI-AL) in rural areas and of Industrial Workers (CPI-IW) for urban areas for each state. The households whose monthly per capita expenditures is lower than the corresponding poverty line are identified as poor for each state and rural and urban sectors from NSSO surveys.

These poverty lines and the procedure of updating of poverty lines have been criticized on many grounds. The major arguments are: use of outdated consumption behaviour of 1973-74; crude procedure of adjustment of price levels; rising income levels of the country warrants for raising the poverty lines; calorie norms as sole determinants of poverty line being inadequate.

The poverty estimates also came under strong criticism on account of the change in questionnaire design introduced in the 55^{th} round of NSSO, making estimates of this round incomparable with previous rounds. Few such important issues concerning poverty line and poverty estimation in India are first discussed in detail below, followed by the latest change in the procedure and methodology suggested by the Tendulkar Committee Report and Rangarajan Committee Report to adjust and update the poverty lines for India.

(a) The NSSO consumption expenditure of 1973-74 was taken as a base for the calculation of poverty line This is criticised as the consumption patterns have changed overtime and it is unlikely that the these consumption patterns would show strong relations with current patterns in either rural or urban areas.

(b) The state poverty lines are calculated from national poverty line estimate using state specific price indices. This is also questionable as the poverty estimates should have been attempted at the state level, since the data were available at the state level, and the all-India estimates should have been a summation of the state estimates of the persons below the poverty lines.

(c) These poverty lines are updated every year by using CPI-IW (for urban poverty line) and CPI-AL (for rural poverty line), to take account of the changes in prices. This has been criticized on two grounds. Firstly, all commodities included in the all-India basket will not be available in every state. Thus, Deaton (2003) argued that the CPIs used to adjust the state specific rural and urban poverty lines over time lead to improbable poverty estimates. For example, in Andhra Pradesh and Karnataka, the official urban poverty lines are around 70% higher than the corresponding rural lines in recent years. In these states, in urban poverty estimates were hence, much higher than estimates of rural poverty. This situation seems unreasonable, as rural poverty has been much higher than urban poverty, across states in India.

Another point of criticism was the rise in rural-urban price differentials (calculated using the poverty lines) from around 15% in 1973-74 to 35%-40% during the period of 1987-1999. Deaton (2003) states, “these large price differentials are not a

reflection of real differences in the cost of living across rural and urban areas but are due to the use of defective price indexes and failure to account for the changes in patterns of consumption across states over long periods of time."

Deaton (op. cit) suggested the alternative way to update the poverty lines overtime. It takes official rural all-India poverty line for the 43rd round (1987-88) of Rs. 115.70 per head per month as the starting point. To calculate state wise rural price index, this poverty line is to be multiplied by the rural price indexes for each state relative to all-India. To obtain state wise urban poverty lines and for all India, the rural poverty lines are scaled up by the respective urban to rural price indexes of the same year. Tornqvist price indexes are used in all above cases. For the subsequent next rounds of survey, the base of all-India rural poverty line is first scaled up to the next round by using the relevant Tornqvist price index for that round relative to the previous round. The state wise rural and then urban poverty lines are then arrived at by following the same procedure described above. Thus, this procedure is not based on only one base period for all calculations, but chains the indexes of current round of survey by giving base as the previous survey round.

(d) The poverty estimates of India experienced a major debate on the issue of change in design of questionnaire of 55th round of survey for the year 1999-2000. The earlier surveys had used a uniform recall period (URP) of 30 days for consumption items, but this survey round used a mixed-recall period (MRP), with one week recall for some items (food, pan and tobacco) and one year for other less frequently purchased items (mainly non-food items) and continued with 30 days for other non-food items. The shift from uniform recall to mixed-recall period is expected to increase the estimates of 30-day expenditure and would lower the official rates of poverty, calculated using these 30-day expenditure. This is so because, the longer (30-days) recall period expenditures would be driven by 7-day recall period for food in the MRP and would report higher spending on food.

The official estimates of the Planning Commission were based on 30-day recall for food items (without considering 7-day recall) and 365-day recall for non-food items. Deaton (2003) suggested the adjustment for the 55th round of NSSO to make it comparable with 50th round of survey[2]. The data for six broad categories (fuel and light,

[2] There are two other procedures for adjustment given by Sen & Himanshu (2004a, b) and Sundaram & Tendulkar (2003a). The details of only Deaton's measure are provided here, as it is the most widely used measure for adjustment of 55th round questionnaire design.

miscellaneous goods, miscellaneous services, non-institutional medical expenses, rent, and consumer cess and taxes) was collected on recall period of 30-day. Out of these six items, the first four items are relevant and more or less all households report expenditures on the first three items The poverty ratio is estimated by calculating the probability of being poor in the 55th Round from each household's 30-day expenditures, taking the relationship between being poor and 30-day expenditures from the 50th Round, and averaging it over all the households. [3]

This procedure depends on two assumptions. Firstly, it assumes that the reported expenditures on these six items (data collected on 30-day recall period) does not change because of other questionnaire changes. Secondly, it assumes a similar relation between consumption of 30-day goods and total consumption in 1999-00, as in 1993–94.

Sen & Himanshu (2004a) asserted that the second assumption is not valid on account of actual shifts in the consumption pattern observed overtime. They substantiated their argument by looking at the share of food in total consumption expenditure and stated that it has declined by 10 and 13 percentage points for rural and urban areas respectively from 1990-91 to 2000-01. Thus, according to them, expenditure share has been shifting from food to non-food, thus violating the assumption of stable Engel curve, which has been important for Deaton's measure of adjustment.

This is led to the problem of comparability of various survey rounds of NSSO. The experts believe that the sharp decline experienced in poverty estimates of the 55th survey (the all-India head count ratio declined to 26 percent from 36 percent from 1993-94 to 1999-2000) is observed partly due to this change and only partly reflect the actual decline observed in the economy.

In the light of above limitations of the poverty estimation in India, the Government formed the Expert Group to Review The Methodology for Estimation of Poverty under Dr. Suresh Tendulkar (Government of India, 2009), which tried to deal with these criticisms. Firstly, it tried to correct for one important error of using consumer price indexes and not the price data from NSSO survey for calculating the poverty line. It used the price data from the NSSO survey for 2004-05 to calculate price

[3] The expenditures on these goods account for more than 20 percent of total expenditures. The expenditures on these are found to be highly correlated with total expenditures with the coefficient of 0.79 for rural areas and 0.86 for urban areas for the 50th survey round.

indexes for both rural and urban areas of the states. Secondly, the committee decided to move away from the calories as a base for specifying the poverty line and broadened the base by including health and education expenditure.

It decided to take the all India urban poverty ratio of 25.7% for 2004-05 (calculated by previous methodology, but accepted as being most reliable poverty figure) and then reworking the corresponding poverty line by adding the estimated per capita health and education expenditures. It then calculated the poverty lines for rural and urban sectors of states and rural all-India by taking Fisher price indices calculated from NSSO data for 2004-05.

Thirdly, it recognized that households are sensitive to the reference period in their response. The committee thus, decided to adopt the estimates of consumption expenditure based on MRP for new poverty line (instead of URP -based approach corresponding to last 30 days prevalent till then). Since, NSSO has started using MRP reference period after 1999-2000, it is also justifiable on this ground that the new poverty line be based on MRP estimates rather than URP estimates.

According to Rath (2011), the major drawback of the new poverty line is that it takes the urban HCR as the starting point, which was based on earlier methodology and hence is not free from issues discussed above. Also, for calculating rural and urban poverty lines for the states, spatial price indices are calculated, which has to be calculated every year for updating the poverty line. This could have been avoided by taking the all-India urban poverty line basket and valuing this basket at the all-India rural and the state rural and urban prices for 2004-05 to calculate the respective poverty lines. These could then be adjusted in subsequent years for changes in prices using NSSO.

The Government formed The Expert Group to Review the Methodology for Measurement of Poverty under Dr. C Rangarajan (Government of India, 2014) and the report was submitted in 2014. The Committee recommended few changes in the methodology of calculation of poverty line. It suggested to revert to the method of deriving estimates of rural and urban poverty of states by using all-India rural and urban poverty baskets. It also recommended the calculation of poverty line on basis of normative levels of adequate nourishment (based on three nutrients – calories, proteins and fats). The normative requirements of expenses on clothing, house rent, conveyance and education and other non-food expenses are then added to arrive at poverty line. The Committee also recommended to use the Modified Mixed Recall Period consumption

expenditure data. The new poverty lines hence calculated for rural and urban areas are monthly per capita consumption expenditure of Rs.972 and Rs.1407 respectively, for the year 2011-12. These poverty lines are 19% higher for rural areas and 41% higher for urban areas, in comparison to estimates given by the Expert Group (Tendulkar). However, the recommendations of the Committee are yet to be approved and implemented by the Government of India.

3.5.3 Trends / Extent of Poverty in India

The incidence of poverty in India fell at a trend rate of around one percentage per annum in the period of 1970 to 1990. Due to macro-economic difficulties of the early 1990s, the rate was declining but it recovered and arrived at the pre 1990 rate of one percentage point by the end of 1990s (Ravallion, 2003). There was strong hope from the economic reforms started in 1990s to bring about rapid poverty reduction. The real GDP per capita experienced an average growth rate of 4.5 percent per annum in the post reform period of 1993-94 to 2004-05, up from 3 percent in 1983 to 1993-94. The highest growing sector after 1991, was the tertiary sector, driven by the growth in services and trade. The manufacturing sector followed, while agriculture was slow to grow and lagged behind.

The two commonly used measures of poverty are poverty incidence i.e HCR and poverty depth. The incidence of poverty had been declining over the last three decades as it fell from 54.9 percent in 1973-74 to 28 percent in 2004-05 (Planning Commission estimates)[4]. The poverty ratio for rural and urban areas in 2004-05 were 29 and 26 percent respectively. During the same period, poverty depth declined by half and was 5.8 for rural and 6.2 for urban areas. Hence, according to the Planning Commission estimates, there has been a major dent in both the incidence and depth of poverty, more so after 1995. According to Himanshu (2007), the numbers of people below the poverty line reached its lowest level of 260 million in 1999-00. The proportion of poor fell three times faster in the period of 1993-94 to 1999-2000 (9.9%) in comparison to the period of 1987-88 to 1993- 94 (2.9%).

Deaton estimates of poverty rates (after making the adjustment for change in questionnaire design of 55th round and the price adjustment) and official estimates are

[4] As discussed in the previous section, there are different poverty estimates for India following the different procedure for calculation and hence whenever the figures and trends are discussed, whose calculation it is based on is mentioned in the text.

the most widely used estimates for economic analysis. Deaton's estimates of HCR for all-India rural are quite similar to the official estimates; however the estimates for all-India urban are much lower than the official estimates (Table 3.10 below). Broadly, at all India and also in large number of states, the estimates reflect a sustained fall in poverty since 1987-88. The pace of poverty reduction in India had also been faster in second period of 1993-94 to 1999- 00 than in the previous period of 1987-88 to 1993-94. According to these estimates, the rural poverty decline annually by 1.3 percentage points and urban poverty by 0.9 percent for the period 1993-94 to 1999-00. This is quite substantial decline and larger than the decline observed in the previous period of 1987-88 to 1993-94.

Table 3.10: State-Specific HCRs (%)

	Rural						**Urban**					
	Official Methodology			**Adjusted Estimates**			**Official Methodology**			**Adjusted Estimates**		
States	**1987–88**	**1993–94**	**1999–00**	**1987–88**	**1993–94**	**1999–00**	**1987–88**	**1993–94**	**1999–00**	**1987–88**	**1993–94**	**1999–00**
All-India	**39.4**	**37.1**	**26.8**	**39**	**33**	**26.3**	**39.1**	**32.9**	**24.1**	**22.5**	**17.8**	**12**

Source: Deaton & Dreze (2002)

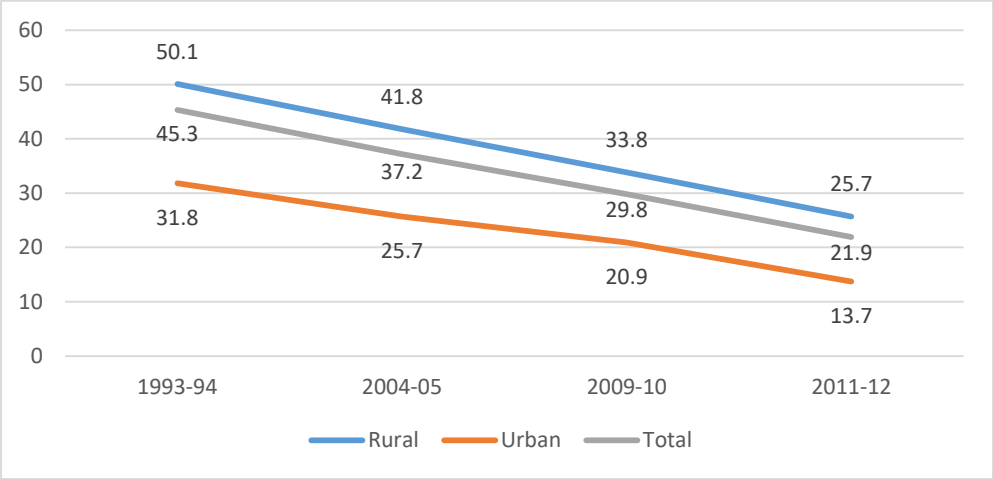
The poverty has been steadily declining but the accompanied rise in per capita expenditure has not quite high (around 10 percent) for the period 1993-94 to 1999-00. This implied that there was large proportion of population close to the poverty line so that even a small growth in per capita consumption expenditure leads to large effects on the poverty rates. The gap in rural and urban poverty in the adjusted estimates was also higher than the official estimates which showed no gap for the year 1987-88.

Following the new methodology proposed in the Tendulkar Committee report, the HCRs for all-India rural and urban were placed at 41.8 and 25.7 percent for the year 2004-05, in comparison to 21.8 and 21.7 percent respectively, from the earlier methodology. The revised poverty line for rural India was about 25% higher and for urban India was about 7% higher (for the year 2004-05) than the earlier one.

The expert group also suggested the procedure for updating the poverty line for 2009-10 (66^{th} survey round of NSSO) and calculated HCR all-India rural and urban at 33.8 and 20.9. This procedure led to significant differences in the estimates of the poverty incidence overall and across regions from the earlier estimates. The number of population below poverty line also fell from 354.7 million in 2009-10 to 269.8 million in 2011-12 (Government of India, 2014). The figure 3.2 below gives the trend of

poverty ratio for rural and urban sectors of India. The rural poverty has almost halved during this period from 50 to 26 and more than halved for the urban sectors from 32 to 14. Thus, the trend of reduction in poverty is continuing from the second half of 1990s and urban poverty has dropped much faster in the last round of 2011-12. The last two years experienced an equal fall in poverty as was there in the previous five years of 2004-05 to 2009-10.

Figure 3.2: All India Poverty Ratio: Rural, Urban and Total



Source: Government of India (2014)

There are large differences observed in the state level poverty rates as shown in the table 3.11 below. Poverty fell in all states between 1993-94 and 2011-12, except in Nagaland where it remained the same. Urban poverty has shown faster decline in this period as compared to the rural poverty. The lowest rural and urban poverty ratios are in Goa for the year 2011-12. However, there has been more concentration in poverty than before, concentrated in the poorer states of Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Manipur, Mizoram and Odisha. The share of bottom seven states in poor population in India increased to 65% in 2011–12, though Bihar and Chhattisgarh have shown a sharp decline in their poverty rates between 2009 and 2012 (IDFC, 13). The better performing states have been Andhra Pradesh, Goa, Kerala, Himachal Pradesh, Meghalaya, Punjab, Sikkim, Tamil Nadu and Uttaranchal. On the whole, the southern states have relatively performed better in poverty reduction over the entire period.

Table 3.11: Poverty Ratio for States in India (Tendulkar Committee Report)

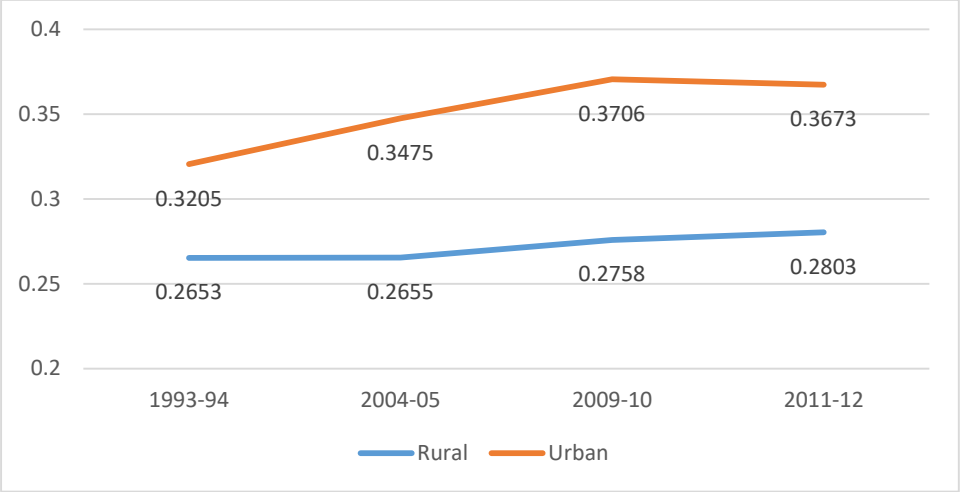
	Rural				Urban			
States/UTs	**1993-94**	**2004-05**	**2009-10**	**2011-12**	**1993-94**	**2004-05**	**2009-10**	**2011-12**
Andhra Pradesh	48	32	23	11	35	23	18	6
Arunachal Pradesh	60	34	26	39	23	24	25	20
Assam	55	36	40	34	28	22	26	21
Bihar	62	56	55	34	45	44	39	31
Chhattisgarh	56	55	56	45	28	28	24	25
Delhi	16	16	8	13	16	13	14	10
Goa	26	28	12	7	15	22	7	4
Gujarat	43	39	27	22	28	20	18	10
Haryana	40	25	19	12	24	22	23	10
Himachal Pradesh	37	25	9	9	14	5	13	4
Jammu & Kashmir	33	14	8	12	7	10	13	7
Jharkhand	66	52	42	41	42	24	31	25
Karnataka	57	38	26	25	34	26	20	15
Kerala	34	20	12	9	24	18	12	5
Madhya Pradesh	49	54	42	36	32	35	23	21
Maharashtra	59	48	30	24	30	26	18	9
Manipur	64	39	47	39	67	35	46	33
Meghalaya	38	14	15	13	23	25	24	9
Mizoram	17	23	31	35	6	8	12	6
Nagaland	20	10	19	20	22	4	25	17
Odisha	63	61	39	36	35	38	26	17
Punjab	20	22	15	8	27	19	18	9
Rajasthan	41	36	26	16	30	30	20	11
Sikkim	33	32	16	10	20	26	5	4
Tamil Nadu	51	38	21	16	34	20	13	7
Tripura	34	45	20	17	25	23	10	7
Uttar Pradesh	51	43	39	30	38	34	32	26
Uttaranchal	37	35	15	12	19	26	25	11
West Bengal	43	38	29	23	31	24	22	15
Puducherry	28	23	0	17	32	10	2	6

Source: Author's calculation using data of various NSSO survey rounds.

3.5.4 Trends / Extent of Inequality in India

There are various measures of inequality and the Gini coefficient of per capita monthly expenditure, calculated from Household Consumer Expenditure survey of the NSSO, is the most commonly used measure in India. The figure 3.3 below gives the trends for rural and urban inequality in India for the period of 1993-94 to 2011-12.

Figure 3.3: All India Inequality: Rural and Urban



Source: Author's calculation using data of various NSSO survey rounds.

Urban inequality has been higher than rural inequality for the period under study. Both rural and urban inequality has been increasing since 1993-94, with urban inequality increasing at a higher rate. Thus, rural-urban inequality has deteriorated over time except in the last period of 2011-12, in which urban inequality fell slightly from 37.06 to 36.73. Radhakrishna (2015) showed that for the period of 1993-94 to 2009-10, rural inequality trend was positive and statistically significant, whereas the trend in urban inequality was not only positive and significant but its growth rate was also markedly higher till 2009-10. The difference between rural and urban inequality is of 9 percentage points for the year 2011-12. Since the rural sector comprises small farmers and wage labourers, the variation in their income and hence expenditures are small. On the other hand, urban sector comprises of formal and also large informal sector in both industry and services sectors and hence, experiences both incomes and expenditures variability.

The inequality levels for rural and urban sectors of the states can be compared using table 3.12 below.

Table 3.12: Gini Index for States in India: Rural and Urban

	Rural			Urban		
States	**2004-05**	**2009-10**	**2011-12**	**2004-05**	**2009-10**	**2011-12**
Andhra Pradesh	0.2515	0.2694	0.2434	0.3417	0.3531	0.3097
Arunachal Pradesh	0.2401	0.2933	0.3345	0.2132	0.2991	0.3226
Assam	0.1820	0.2199	0.2108	0.3010	0.3275	0.3447
Bihar	0.1851	0.2153	0.2038	0.3116	0.3189	0.2809
Chhattisgarh	0.2508	0.2339	0.2407	0.3540	0.3050	0.3871
Delhi	0.2616	0.2333	0.2823	0.3243	0.3523	0.3731
Goa	0.2665	0.2194	0.2795	0.3329	0.2514	0.2922
Gujarat	0.2514	0.2516	0.2465	0.2953	0.3088	0.2839
Haryana	0.2953	0.2775	0.2492	0.3257	0.3565	0.3824
Himachal	0.2595	0.2825	0.272	0.2609	0.3509	0.3288
Jammu & Kashmir	0.1969	0.2206	0.2454	0.2413	0.3073	0.3022
Jharkhand	0.1985	0.2120	0.2112	0.3259	0.3429	0.3382
Karnataka	0.2322	0.2313	0.2605	0.3577	0.3747	0.4063
Kerala	0.2941	0.3497	0.3507	0.3527	0.3998	0.3885
Madhya Pradesh	0.2365	0.2764	0.2612	0.3505	0.3652	0.3608
Maharashtra	0.2700	0.2438	0.2516	0.3502	0.3795	0.3581
Manipur	0.1362	0.1591	0.1928	0.1488	0.1925	0.1988
Meghalaya	0.1363	0.1703	0.1723	0.2403	0.2428	0.2278
Mizoram	0.1665	0.1941	0.2434	0.2132	0.2283	0.2446
Nagaland	0.1729	0.1814	0.1915	0.2136	0.2221	0.2277
Odisha	0.2535	0.2474	0.2341	0.3297	0.3753	0.3452
Punjab	0.2626	0.2851	0.2691	0.3233	0.3575	0.3131
Rajasthan	0.2041	0.2136	0.2275	0.3033	0.3155	0.3065
Sikkim	0.2358	0.2593	0.1927	0.2317	0.1861	0.1980
Tamil Nadu	0.2584	0.2566	0.2751	0.3445	0.3274	0.3297
Tripura	0.2034	0.1969	0.2074	0.2996	0.2876	0.292
Uttar Pradesh	0.2337	0.2307	0.2478	0.3391	0.3951	0.4052
Uttaranchal	0.2226	0.4375	0.2559	0.3017	0.3208	0.3413
West Bengal	0.2411	0.2197	0.2351	0.3564	0.3844	0.3816
Puducherry	0.2813	0.2543	0.2509	0.3019	0.3775	0.2684

Source: Planning Commission

In all the states, except Arunachal Pradesh, urban inequality is higher than rural inequality. In 19 out of 30 states considered above, the rural inequality has increased in the period of 2004-05 to 2011-12 and urban inequality has increased in 18 states, out of which 14 states are common. For the year 2011-12, the states with higher rural inequality than the national average are Arunachal Pradesh, Delhi and Kerala. There are four states with rural inequality lower than 0.20 and all of them are north-eastern states. There are seven states that have experienced urban inequality higher than national average namely, Chhattisgarh, Delhi, Haryana, Karnataka, Kerala, Uttar

Pradesh and West Bengal. However, the urban inequality index is lower than 0.20 for Manipur and Sikkim.

Sen & Himanshu (2004a, b) provided evidence regarding the inequality in India and stated that during the 1990s, disparities in consumption, between rich and poor and between urban and rural parts of India, were increasing. This trend seems to be continuing even in the decade of 2000. Deaton & Dreze (2002) also showed evidence of increased rural-urban per capita consumption inequality rural-urban inequalities for the states during 1993-94 to 1999-00. This trend also continues to reflect in the more recent data for 2004-05 to 2011-12. This increase in intra state rural/urban inequality is worrisome for the future of Indian growth and development especially for the objective of poverty alleviation.

3.6 Summary

The chapter looked at the liberalization policies followed and its impact on India's merchandise trade. The chapter also provided the details of the methodology followed to calculate the measure of trade openness of the states of India. The chapter further delved into the issues of poverty measurement and levels and extent of poverty and inequality observed in India.

Following the balance of payments and fiscal crisis in early 1990s, India initiated the process of liberalization. It undertook major economic reforms and drastically reduced the tariff rates, removed non-tariff barriers from the commodities and made exchange rate convertible to pursue liberalization of trade.

The reforms led to fast growth in India's merchandise trade and increase in India's share in global exports. The commodity composition didn't change much at a broad sectoral level but the share of capital intensive exports had been increasing and share of labour intensive exports declining in India's trade basket. This trend goes against the theory of comparative advantage and has been a focus of many studies in India.

As far as poverty is concerned, there are many debates and issues regarding the concept and the definition used for the analysis. In India, there had been other specific issues as well, regarding the definition and updating of the poverty line and the incomparability of the 55^{th} survey round of NSSO. Though, the different procedures followed for the calculation of poverty present different results, there is no denying the fact that poverty has declined steadily since 1970s. The poverty incidence reduced from

54.9 percent in 1973-74 to 22 percent in 2011-12. The decline has been observed in both rural and urban sectors of the states, though there have been large differences across states.

At the same time, inequality (both rural and urban) has been showing an increasing trend, with much higher rate of increase for the urban inequality, leading to worsening of the rural/urban disparity at the national level. The data also reveals worsening of intra state rural/urban inequality.

The debatable issue is the relationship between pace of poverty decline and liberalization reforms followed after 1991. An important area of concern is whether trade liberalization led to slowdown in the progress made in poverty reduction. This issue has been dealt in the subsequent chapters of the study.

Chapter 4

Trade Openness, Income, Poverty and Inequality: Model Estimates

4.1 Introduction

The effect of trade liberalization on poverty can be studied via two channels: static and dynamic, as detailed in Chapter 2. The dynamic channel of growth is considered to be the more important channel in the literature, the channel operating through two causal relations - trade promotes growth and growth leads to reduction in poverty. This chapter attempts to analyse the relation between trade liberalization and poverty by estimating a simultaneous equation model using panel data for 21 major states of India for the years 1993-94, 2004-05, 2009-10 and 2011-12.

According to theory, trade openness is good for growth as it provides incentives for investment and technological change, access to new ideas and innovation, gains in efficiency from specialization and availability of newer products (Janvry & Sadoulet, 2016). However, earlier empirical studies have found contradictory results of the relationship between trade liberalization and growth.

There is consensus that growth reduces poverty levels as shown by Dollar & Kraay (2002), Ravallion (2004), Ravallion & Chen (1997) etc. According to Dollar & Kraay (2002), the per capita incomes of poor rise on average by the same percentage as for everyone else in the economy, hence "growth is good". Thus, there is an agreement, in the literature on the necessity of growth for poverty reduction.

Other researchers such as Dreze & Sen (2013), however, argue that growth is necessary for poverty reduction, but not sufficient. In the presence of widening income inequalities accompanying growth, this relationship can reverse (Bird, 2004). According to Ravallion et.al. (2007), pro-poor growth has two distinct forms; "relative pro-poor" if inequality in a country falls and "absolute pro-poor" if the inequality rises. The changes in the poverty rate hence, in any given country, are the result of changes in mean income and in income distribution, as depicted by the poverty – growth – inequality (PGI) triangle of Bourguignon (2003). These contradictions or ambiguity in both theoretical and empirical literature are discussed in detail in Chapter 2, presenting the review of existing studies.

The earlier studies largely focussed on analysing the two causal relations - trade promotes growth and growth leads to reduction in poverty - independently. The present

study attempts to build a simultaneous equation model of four variables – Trade Openness, Income, Poverty and Inequality. To the best of our knowledge, there is no study which has modelled these four variables together and tried to estimate the impact of trade openness on poverty through its effect on growth and inequality, at least for India. Also, since trade openness-growth and growth-inequality relations exhibit two way causality, it is important to take care of endogeneity of these variables in the empirical analysis.

The chapter is structured as follows: Section 4.2 briefly reviews the relevant empirical studies pertaining to the Indian economy; Section 4.3 presents the analytical framework and the econometric model to be estimated; Section 4.4 provides the definitions of the variables and sources used to collect the data of variables; Section 4.5 presents the methodology for the empirical exercise; Section 4.6 presents and analyses the econometric results of both the simultaneous equation model and the direct link between trade openness and poverty (single equation model) and also tests the results for robustness. Section 4.7 presents the summary and conclusion.

4.2 Review of Literature on Inter relationships among Trade Openness, Income, Poverty and Inequality in India

The review of studies presented in chapter 2 establishes that both theoretically and empirically the relationships among trade openness, income growth, poverty and inequality are ambiguous. In light of this, empirical evidence available for the Indian economy, is reviewed below.

Singh (2010) provides a broad review of the extensive literature on identifying the impact of trade liberalization on economic growth and concludes that macroeconomic evidence provides the significant positive effects of trade on output and growth. Sarkar (2005 & 2008) studied the relationship between growth rate and trade openness for the period of 1956 to 1999. The measures of openness used were Imports/GDP, Exports/GDP and Trade/GDP. No positive long-term relationship between trade openness and growth rates of both real GDP and per capita real GDP was found. Chatterji et.al. (2013) examined the relationship for the time period of 1970-2010. They used both trade barriers and trade volumes as the proxies for trade openness and found no evidence that trade openness explains the present growth of India. But when the model was re-estimated to account for the change in policy regime after 1980

onwards, the results indicated that trade volumes have a positive relation and trade barriers have no significant relation, with growth in India.

On the other hand, Mallick (2008), Dash & Sharma (2008) and Marelli & Signorelli (2011), have found the contrasting results of positive impact of trade openness on growth. Marelli & Signorelli (2011) employed the time series and panel data methodologies for empirical investigation for the period of 1980 to 2007. The results showed robust positive effect of openness and FDI on economic growth of India and China, with controls for other key variables. Acknowledging the fact that the measures of openness would not be exogenous in the model, they re-estimated the fixed effects model by 2SLS using instruments like value added share of industry in GDP, telephone main lines per 1000 persons and urbanization. The coefficient of trade openness still remained positive and significant, reconfirming the above findings.

The second causal relation between income growth and poverty reduction is fairly well established, both theoretically and empirically. In India, this hypothesis was observed to hold during the 1980s, as the experience suggests that economic growth typically reduced poverty levels (Datt & Ravallion, 2002). A breakthrough was achieved in 1991 through the process of economic reforms of trade and investment liberalization. This led to a rapid increase in the rate of economic growth. However, there is debate about what happened to poverty post 1991. Some economists observed that fall in poverty has been more rapid in 1990s in comparison to period prior to it (Bhalla, 2000). Others observed that reduction in poverty was delayed and there might also be an increase in the poverty rate (Sen, 2001). According to Datt & Ravallion (2002), India probably maintained same rate of poverty reduction in the 1990s as in 1980s. Their results suggested that the poverty incidence had been declining by less than one percentage per year after the reforms. However, the reduction in rural poverty in the 1990s had been much slower than in the 1980s, due to increase in rural inequality (Jha, 2002). So, despite healthy growth, poverty persisted because of the increase in inequality and the sluggish increase in agricultural wages.

A recent study by Datt & Ravallion (2011) addressed the questions of whether high post reforms growth rate of India has led to decline in absolute poverty. They found that the growth elasticity of poverty reduction did not change between pre and post reforms periods. The findings suggested that urban growth was helpful in reducing urban poverty, and rural growth in reducing rural poverty. It was also found that in the

later period, rising in living standards in urban sectors led to significant distributional effects in favour of poor population in rural areas.

The reduction in poverty, accompanying growth, depends also on the concomitant fall in inequality. Topalova (2008) and Cain et.al. (2010b) analysed the change in poverty by decomposing it into growth effect and distribution effect for the period of 1983 to 2004. The results showed that redistribution helped to enhance the poverty reduction in 1983-93, especially in the rural areas. In the later post-reform period, the distribution effect significantly reduced the extent of poverty reduction in both rural and urban areas. The decline of poverty incidence in India would have been higher than the actual decline observed, by 22% in rural areas and 76% in urban areas, subject to no change in distribution of income accompanying economic growth.

Radhakrishna et.al. (2013) examined the factors contributing to decline in poverty between 1993–94 and 2009–10 and found that the all India reduction in poverty would have been higher by around 2 percentage points in 2009-10, if the inequalities of the states had remained constant at 1993–94 levels. Radhakrishna (2015) further showed that for the period of 1993-94 to 2009-10, both rural and urban inequality showed significant upward trend for India.

As the period of economic liberalization witnessed increases in consumption inequality, it is also important to analyse whether this could be attributed to trade openness. Mitra (2016) claimed that the tariff reductions were found to be increasing inequality in a statistically significant way for the period of 1981-2013. Similar analysis for the sub national level was followed in Krishna & Sethupathy (2011) for the period of 1988 – 2005. The study concluded that for the states, change in household inequality was not found to be correlated with the change in tariff and nontariff protection measures. Topalova (2005) also studied district level inequality in both rural and urban areas for 1983 to 1999. The inequality measures were regressed on the district exposure to international trade, measured as district level tariffs and the results showed that inequality remained unaffected with trade liberalization. Hence, the available literature largely supports the argument that the impact of protection on inequality is not found to be statistically significant for India.

Topalova (2005), Hasan, Mitra & Ural (2007) and Cain, Hasan & Mitra (2010a) analysed the relationship between trade and poverty levels of India in a single equation (reduced form framework) by assuming explanatory variables as exogenous. However, this framework suffers from the limitation of relating trade policy directly to poverty

reduction without specifying the underlying model for such a relationship. Topalova (2005) attempted to establish the relationship between poverty and trade policy, for the districts, in a regression framework of the following form:

$$y_{d,t} = \alpha + \beta . \text{Tariff}_{d.t} + \gamma_t + \delta_d + \varepsilon_{d.t} ,$$

where $y_{d,t}$ is poverty incidence of districts, and $\text{Tariff}_{d.t}$ is the measure of international trade exposure of districts. An important coefficient to analyse is estimates of the average effect of trade on poverty. The study found that trade liberalization led to an increase in poverty incidence and poverty gap in the rural districts. However, the study found no statistically significant results for the urban districts.

Hasan, Mitra & Ural (2007) investigated the impact of trade liberalization on poverty, using data for states of India. The study first analysed the impact of trade policy on state per capita income and then secondly, the impact of state per capita income on poverty incidence. It was found that protection declines in the manufacturing industries (and concomitant increases in their output) led to increases in per capita incomes. For the second relation, a positive effect of state per capita incomes on reduction in poverty incidence was found (with a coefficient value of 1.15). The study further examined the direct relationship between trade protection and poverty following the same regression framework as Topalova (2005). The overall results indicated that over time and across states, fall in protection levels reduces the incidence of poverty on average (coefficient value of 0.75). The investigation provided strong evidence supporting the poverty reducing effects of trade reforms. Cain, Hasan & Mitra (2010a) further extended this analysis and got similar results.

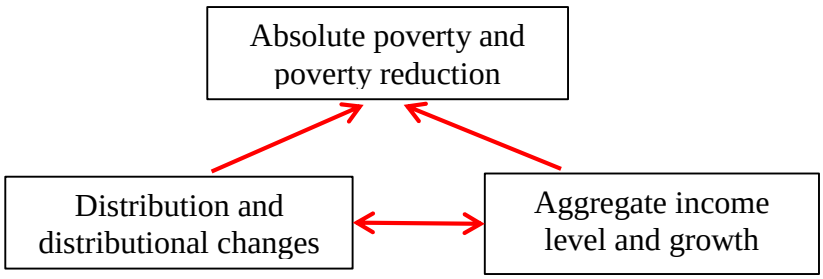
From the review above, it can be concluded that the direct impact of trade openness on poverty has been ambiguous. It is also difficult to reach a definitive conclusion about the impact of trade liberalization on income growth, in contrast to the stronger support for the positive impact of growth on poverty. However, the effect of growth on inequality has been quite substantial but trade openness has not been found to be significantly affecting inequality, especially at the state or district level in India.

4.3 Analytical Framework and Model Specification

The model of this chapter builds on Poverty – Growth – Inequality triangle (also known as development triangle) of Bourguignon (2003) given below. According to it, the growth rate of average income of the population and change in the income distribution fully determine poverty reduction in a country at a given point of time.

Therefore, for poverty reduction, an important issue to be considered is whether growth leads to reduction or increase in inequality and whether high inequality promotes or hinders growth. Thus, growth and income distribution have to be studied simultaneously for analyzing poverty reduction.

Figure 4.1: Poverty – Growth – Inequality Triangle



Source: Bourguignon (2003)

The interactions among these three variables lead to the following relations: First, consider the relation between growth and poverty. There is no dispute about the role of growth in poverty reduction. A higher growth (given the constant level of inequality) would reduce poverty. But how much of growth actually trickles down to the poor is measured by the growth elasticity of poverty. If elasticity is greater than one, then growth is considered to be pro-poor as it benefits the poor more than the average population. However, inequality changes accompanying growth will determine the extent to which economic growth leads to poverty reduction.

Second, the impact of inequality on poverty. There is again no ambiguity in this relationship as less inequality (at a given rate of growth) would lead to reduction in poverty. In fact these last two effects reinforce each other for poverty reduction. Datt & Ravallion (1992) showed that growth is essential for poverty reduction but growth is more pro-poor if inequality does not increase and thus inequality reduction may contribute to poverty reduction. This impact is accentuated if fall in inequality further increases growth.

Third, the effect of growth on inequality. There are many ways in which growth impacts inequality, most famously given by Kuznets “inverted U curve” and Lewis model. This hypothesis was found to be true across countries in studies focusing on the decade of 1960s and 1970s. In the subsequent evolution of inequality across countries, this empirical relationship was not found (Deininger & Squire, 1996). However, it doesn’t mean that growth is not significantly impacting inequality but perhaps indicates

the importance of country specific factors in determining this relationship and hence cannot be generalized across countries (Bouguignon, 2003).

Fourth, the effect of inequality on growth. This is found to be ambiguous. Following Kaldor (1956), it has been argued that inequality is favourable for growth. Higher inequality favours higher rate of savings (because richer population exhibit higher savings rate than the poorer population), and hence the rate of investment and growth. There are also various counteracting channels such as, inequality induces crime and political stability; the impact on voting patterns and fiscal policy followed as a response; effect on the composition of investment; fall in human capital (as poor population may not be able to invest in human capital); reduction in the domestic market size and the impact on the quality of institutions (Janvry & Sadoulet, 2016).

According to Bourguignon (2003), due to the presence of reverse causality in growth-inequality relation, empirical verification from "growth" equation by taking inequality as an independent variable would produce ambiguous results (because of endogeneity bias). One way out of this ambiguity is to try estimate the 'structural' model of the growth inequality relationship formalizing the various factors discussed above on the distributional consequences of growth.

The main objective of present study is to analyze the impact of trade openness on poverty in India. For this, it super imposes trade openness on the PGI triangle (and relations depicted there), as the impact of trade openness on growth and therefore, poverty cannot be meaningfully studied independent of these relations.

The theory of trade is ambiguous about impact of trade openness on growth with contrasting evidence. Theoretically the models supporting the argument are given by Harrod and Domar (trade is characterized as 'engine of growth'), Romer (endogenous growth theory) and Todaro (trickle-down theory of growth). The counteracting arguments indicating no direct link between them has been argued by Solow and neoclassical growth models. On the other hand, as total output of the economy comprises domestic output and exports, exports are determined by size and economic growth of the country. Imports can also improve productivity by reducing scarcities (of goods and inputs) and also by providing improved quality inputs and newer technology. Also, imports are part of consumption in the economy and comprise largely of "income elastic" goods. Hence, increase in per capita income would lead to increase in the share of imports as well as exports, to pay for the rising imports (Esfahani, 1991). Thus both exports and imports not only affect growth but get affected by it as well.

The reverse causality is thus, present between trade openness and growth, similar to growth-inequality relationship. To account for these inter relations, the present study adopts a simultaneous equations model of four structural equations, for the four endogenous variables. The important determinants of these variables are discussed below:

(1) Poverty: An important contribution to the field of poverty analysis comes from two authors, Martin Ravallion and Gaurav Dutt. Datt & Ravallion (1998 & 2002) and Ravallion & Dutt (2002), tested for differential impact of various sources of growth on poverty across states in India. They regressed log of poverty on log of mean income, real non-farm product per head, output per hectare, real per capita development expenditure and rate of inflation. Topalova (2005), Hasan, Mitra & Ural (2007) and Cain, Hasan & Mitra (2010a) explained poverty as determined by trade liberalization and few factors such as, transportation infrastructure (road density) and financial system (private credit per capita or bank branches per capita). The control variables included were GDP and development expenditure per capita.

In a simultaneous equation framework of studying the effect of public expenditure on rural growth and poverty in India, Bathla et.al. (2015) incorporated factors such as agricultural income, wages, terms-of-trade, non-farm employment, population density and rainfall index, in their equation for rural poverty. Radhakrishna & Panda (2006) in their equation for poverty of both rural and urban areas included, in addition to GDP other factors such as, agricultural income, service sector income, development expenditure, relative food prices, and inflation.

(2) Growth: Explaining growth is a problem faced by economists since a long time and even after a decade of proliferation of studies, there is no consensus on the determinants of economic growth. There are broadly two families of growth models. Classical and neo-classical model given by Harrod and Domar and Solow respectively, and enodogenous growth models given by Romer (these models and developments therein are discussed in Chapter 2).

The empirical analysis of growth distinguish between the proximate and the fundamental causes of growth. The proximate causes include the factor inputs (as labour and capital) and important determinants of the productivity of these inputs (as technological change and economies of scale). But even in the presence of these factors, countries differ with respect to combining these factors and adopting knowledge and skills. To answer this, economists have investigated the fundamental determinants of

growth and laid emphasis on institutions, trade openness and also distinguished between two forms of capital as human and physical capital (Rodrik et.al. 2004). Trade openness is also added as a determinant in the growth equation estimation in the literature.

The recent studies mainly focus on the extended versions of the neoclassical growth model. A linear regression of the following form is estimated either using the cross-sectional or panel data (Rodriguez, 2008):

$$\gamma_{yit} = \alpha_o + \alpha_1 y_{it-1} + \beta_1 z_{i1t} + \ldots\ldots + \beta_k z_{ikt} + \varepsilon_t$$

where γ_{yit} is per capita GDP rate of growth; y_{t-1} is log of initial GDP and z_{i1t}, ……, z_{ikt} are country specific control variables such as physical capital investment and human capital investment, labour force, population growth rate and other potential variables as policies, institutions and economic structure. Rodriguez (2008) discusses the problems and complexities in the empirical analysis of economic growth.[5] Given the multidimensionality of growth process, he concludes that cross-sectional empirical analysis is too coarse to capture the real complex world of growth. But there is a wide scope of application to country level analysis which have been under-explored territory in the study of economic growth.

(3) Trade: Exports and imports are generally postulated to depend on the relative competitive position of the nation as well as condition of international markets. Thus, income and prices are the conventional factors used for explaining the exports and imports of a country. The level of industrialization (taken as rate of industrial output) can also be expected to affect the rate of exports (Salvatore, 1983). Berg (1996) explained export growth and import growth by factors such as, growth rate of GDP, real exchange rate and weighted average of growth rates of key trade partners. An important model explaining trade between countries is the gravity model, wherein important determinants of trade (in the context of developing economies) include tariff, import duty, inflation, FDI, exchange rate, transportation cost and GDP.

Kumar (2001) tried to identify different factors expected to affect the magnitude of exports and imports of India. These were grouped in three heads: (a) Factors affecting

[5] He cautions about some problems facing the above equation such as omitted variable bias, lack of robustness, measurement error and endogeneity of variables or reverse causation. He also delves into the functional specification of the equation, whether to take a linear equation or non-linear and the specification of non-linearity. To deal with the problem of unknown nonlinearity in the growth equation, he suggests the use of nonparametric regression analysis but argues that results are discouraging and almost inconclusive regarding the determinants of growth.

the exports demand, which include growth rate of world economy and principal trading partners and various WTO agreements. (b) Factors affecting the exports supply include amongst others infrastructural bottlenecks, growth of domestic demand, inflows of export-oriented FDI, technological upgrading. (c) Factors affecting the imports demand are domestic growth rate, crude prices, industrial restructuring and rationalization.

(4) Inequality: Bourguignon (2003) claimed that the most important factor explaining income inequalities across countries is economic growth. The other relevant factors are financial development, inflation, government consumption, population rate of growth, level of access to education and trade liberalization.

Analysing the effect of trade openness on inequality of districts of India, Topalova (2005), incorporated trade liberalization measure as the main explanatory variable, and few initial characteristics of districts such as percentage of workers employed in different economic sectors, percentage of literate population and proportion of scheduled caste (SC) and scheduled tribe (ST) population. Pal & Ghosh (2007) identified the main factors behind growing inequality in India as fiscal policy; financial sector reforms; liberalization of foreign and domestic investment; and trade liberalization. Topalova (2008) included PCNSDP, financial development, labour regulation, human capital, infrastructure and expenditure on social services, for analysing the factors relevant for inclusiveness of growth in Indian states.

The simultaneous equations model, based on the relevant theoretical and empirical research literature, is specified below. All variables are in natural logs of the respective variables.

$$PI_{it} = \alpha_0 + \alpha_1 PCNSDP_{it} + \alpha_2 PCGovtExp_{it} + \alpha_3 Agr_{it} + \alpha_4 Pop_{it} + \alpha_5 INE_{it} + \alpha_6 Infl_{it} + \varepsilon_{1it} \quad (1)$$

$$PCNSDP_{it} = \beta_0 + \beta_1 Trade_{it} + \beta_2 Wkg_{it} + \beta_3 GradPop_{it} + \beta_4 PCGovtExp_{it} + \beta_5 INE_{it} + \beta_6 Infl_{it} + \varepsilon_{2it} \quad (2)$$

$$Trade_{it} = \theta_0 + \theta_1 PCNSDP_{it} + \theta_2 PCCapExp_{it} + \theta_3 Credit_{it} + \theta_4 Pop_{it} + \theta_5 Infl_{it} + + \varepsilon_{3it} \quad (3)$$

$$INE_{it} = \eta_0 + \eta_1 PCNSDP_{it} + \eta_2 Trade_{it} + \eta_3 PCCapExp_{it} + \eta_4 GradPop_{it} + \eta_5 Pop_{it} + \eta_6 Infl_{it} + \varepsilon_{4it} \quad (4)$$

The four endogenous variables (appearing on the left hand side of the equations) of the model are:

PI = Poverty Indicator (taken as poverty incidence)

PCNSDP = Per capita Net State Domestic Product

Trade = Measure of trade openness (Trade as a percentage of GDP)

INE = Measure of Consumption Inequality (Gini Coefficient).

The exogenous variables in the model are:

PCGovtExp = Per capita government expenditure (taken as a measure of fiscal policy)

Agr = Share of agricultural sector in GDP (taken as a measure of growth of rural sector in the economy)

Pop = Rate of growth of population

Infl = Rate of inflation (CPI-IW) (taken as a measure of other macro-economic factors)

Wkg = Proportion of working population (in the age group 15 – 69) (taken as a measure of labour force)

GradPop = Proportion of graduates and above in the population (more than 6 years of age) (taken as a measure of human capital)

PCCapExp = Per capita capital expenditure of the government (taken as a measure of investment)

Credit = Private credit / GDP (taken as an indicator of financial deepening).

In the model, poverty (Equation 1) is determined (in addition to two endogenous variables - per capita NSDP and inequality) by per capita government expenditure, share of the agriculture in GSDP, population growth rate and inflation. The government per capita expenditure (especially on social and welfare schemes) is included because it plays a crucial role for poverty reduction in India. Share of output of agriculture in GDP is expected to have an impact on poverty reduction (Datt & Ravallion, 2011) and is included in the equation. Population growth is also typically assumed to affect the level of poverty adversely (Donald & Majeed, 2010). Inflation rate is a relevant variable (taken as control variable) affecting the macroeconomic relations and is important to be considered. It would affect the poverty levels as higher inflation is expected to adversely affect the poor, making it harder for them to meet the necessities of life and trapping them in the vicious circle of poverty.

Using neoclassical growth theory, PCNSDP (Equation 2) in present model, is specified as a function of the labour force (taken as the proportion of working population), human capital (taken as proportion of graduates and above in the population), per capita government expenditure and inflation (apart from two endogenous variables – trade openness and inequality). The investment level of the

economy is an important determinant but could not be included as comprehensive state wise data for investment or capital formation is not available for India.[6] To consider other factors affecting the relationship between trade openness and growth, Wacziarg (2001) recommended to add measure of government consumption and macroeconomic policy to the growth equation. The government consumption expenditure (which also denotes a measure of fiscal policy) and rate of inflation (to capture the overall macro environment and the monetary policy of the economy) hence, are added in the equation above.

Many important determinants of a country's trade such as tariffs, exchange rate, relative price of domestic country vis-à-vis rest of the world, growth of principal trading partners, WTO and bilateral agreements of trade, cannot be included in equation (3) which explains trade openness at the state level. Hence, important variables explaining state trade openness (apart from PCNSDP) included are, investment (taken as per capita capital expenditure), financial deepening (taken as credit to GDP ratio), population growth rate and inflation. Investment is an important factor as infrastructural bottlenecks delay transportation of goods and also affect the quality of goods exported (Kumar, 2001). Another relevant variable is financial development as a more developed financial sector is likely to exert a positive effect on the trade balance (Hasan et.al, 2013). Inflation captures the overall macroeconomic scenario and hence acts as the control factor, controlling for other macroeconomic variables affecting trade.

In Equation (4), inequality is specified as a function of per capita capital expenditure, proportion of graduates and above in the population of more than 6 years of age, rate of growth of population and inflation. The equation has PCNSDP and trade openness as two endogenous variables. Capital expenditure of the government directly influences the development and infrastructural expenditure affecting the level of inequality (Pal & Ghosh, 2007 and Topalova, 2008). An important factor determining inequality of income is the access to education which is measured by the proportion of graduates and above in the population in the equation. It is expected that unequal access to education leads to higher income inequality as it widens the gap between productivity and skill in the working population. Inflation is expected to hurt the poorest strata of

[6] One way is to proxy it by taking capital expenditure of the government which will at least substitute for public investment, as there is no measure available for private investment. But it has been dropped from this equation due to high correlation with per capita government expenditure leading to the problem of multicollinearity.

society as it causes deterioration in income inequalities in the economy and leads to allocation of wealth more in favour of rich than poor (Donald & Majeed, 2010).

4.4 Definitions of Variables and Sources of Data

The definitions of variables and their data sources are detailed below.

In the year 2000 three new states were made namely, Chhattisgarh, Jharkhand and Uttaranchal which were earlier parts of Madhya Pradesh, Bihar & Uttar Pradesh respectively. These new boundaries of the states have been considered to maintain consistency across years, and data for the newly formed states are constructed accordingly (data is adjusted for Madhya Pradesh, Bihar and Uttar Pradesh, respectively) for period prior to the year 2000.

Poverty Indicator: The most widely used measure of poverty is the head count ratio or poverty rate calculated for the states of India. This measures the percentage of population with monthly per capita expenditure less than the specific poverty line. The data for household consumption expenditure along with other household and individual characteristics are collected by the National Sample Survey Office (NSSO) for rural and urban households. For post liberalization period covered under the study, data is available for five thick rounds of NSSO surveys for the years 1993-94, 1999-00, 2004-05, 2009-10 and 2011-12.

The present study uses poverty lines given by the Tendulkar Committee Report.[7] These poverty lines cover all years under the study and hence provide comparable measures of poverty in India across these years. There are controversies surrounding data on household consumption expenditure collected in the 55th round of NSSO survey for the year 1999-00.[8] Due to non-comparability of poverty estimates for the year 1999-00, this chapter excludes it from the empirical analysis and hence includes data for only four remaining NSSO surveys.

Per Capita NSDP: Real per capita NSDP is taken as the measure of income. The data source for NSDP per capita (constant prices) is Central Statistical Office (CSO).

[7] There are concerns regarding the official poverty lines used to calculate the poverty estimates. The details of these and other controversies regarding calculation of poverty in India are provided in chapter 3, section 3.3.

[8] There is a general agreement that the estimates based on the 55th NSSO round are biased downwards due to a change in methodology of collecting data on household consumption expenditure (Datt & Ravallion, 2002). However, there is no agreement yet on the extent to which poverty has been underestimated. This controversy was also covered in detail in chapter 3, section 3.3.

The data is available at different base year prices and converted to constant 2004 - 05 prices.

Measure of Trade Openness: The exports plus imports as a percentage of NSDP is taken as measure of trade openness for the states of India. The methodology to construct this measure was detailed in chapter 3, section 3.3. It can be generally argued that trade policy variables are exogenous but trade values are not, and are affected by other macro-economic factors. So, one of the limitations of taking trade volumes is that it would lead to simultaneity bias, especially when income is also included in the model (Goldberg & Pavcnik, 2004). This has been taken care of by adopting simultaneous equation model for the analysis.

Measure of Consumption Inequality: The inequality is measured by computing the Gini index of monthly per capita expenditure of each state. This is calculated using data of household consumption expenditure, collected by NSSO (as is used for the measurement of poverty indicator).

Per Capita Government Expenditure is taken as a measure of fiscal policy and is calculated by adding government expenditure on both revenue and capital account. The data taken from various reports of State Finances, Reserve Bank of India (RBI), is available at current prices. The GDP deflators are used to calculate the data at constant 2004 - 05 prices. Per capita government expenditure is obtained by dividing it by population.

Share of Agriculture Sector in total GDP is calculated by taking GDP accruing from the agriculture sector of the state and dividing it by total GDP of the state. The data for both variables are taken from CSO.

Population Growth Rate: The data for population of each state is taken from Economic and Political Weekly Research Foundation (EPWRF) to calculate the annual growth rate for the years in consideration.

Inflation Rate: The inflation rate is calculated using the State-specific Consumer Price Index of Industrial Workers (CPI-IW) for urban areas. The data is taken from EPWRF. CPI-IW is available at different base years, which is then converted to common base year of 1982.

Proportion of Working Population is arrived at by taking the share of population between 15 and 69 age in total population of the states and is calculated from data of specified rounds of NSSO Employment and Unemployment survey.[9]

Proportion of Graduates & Above in the population (more than 6 years of age) of each state is also calculated from data of the NSSO Employment and Unemployment survey rounds.[10]

Per Capita Capital Expenditure: The investment level of the economy is an important determinant of economic growth. Capital expenditure of each state is taken as a measure of investment as comprehensive state wise data for investment or capital formation is not available.[11] The correlation for the national figures for gross capital formation and capital expenditure is as high as 0.85. The data at current prices is taken from EPWRF and converted to constant 2004-05 prices by employing GDP deflators. The variable is expressed in per capita terms by dividing it by population

Credit: Financial Deepening of the state is determined by private credit given by the banks and financial institutions. Hence, private credit divided by GDP is taken as a measure of financial deepening. The data is collected from the Banking Statistics, RBI.

4.5 Econometric Methodology

4.5.1 Panel Data OLS Estimation

The simultaneous model comprising of four equations (1 to 4) given above, are first estimated using the panel data methodology on each equation by assuming the right-hand side (RHS) variables as exogenous. The regression equation is (Baltagi, 2008):

$$y_{it} = \alpha + X'_{it}\beta + u_{it} \qquad i = 1,\ldots\ldots,N; \quad t = 1,\ldots\ldots, T \qquad (5)$$

where i represents cross sectional unit i and t denotes time. α is a scalar, β is $K \times 1$ and X_{it} is the $_{it}$th observation on K explanatory variables. A one-way error component model ia assumed for the disturbances: $u_{it} = \mu_i + v_{it}$ where μ_i represents the unobservable individual specific effect and v_{it} denotes the remainder disturbance. The unobservable

[9] Sampling weights are used to derive population level for this variables.
[10] Same as above
[11] The same approach of taking capital outlay as a proxy for investment at the state level has been followed by Bathla et. al (2015) and Nayyar (2008).

individual effect (μ_i) can be assumed as unit specific constant term (fixed effects model) or unit specific disturbance (random effects model).

An important assumption is E (u_{it} / X_{it}) = 0 and is critical as disturbances contain time invariant effects (μ_i) which are unobserved and may be correlated with the X_{it}. Whether these unobserved individual effects are correlated or not with the regressors is the crucial distinction between fixed and random effects models. Generally the preference is for fixed effects model because it produces consistent estimates even if X_{it} and μ_i are correlated. The random effects estimator is biased and inconsistent in this case.

The critical question is - how to choose between the fixed effects and random effects model? This can be dealt in two ways:

(1) Hausman's Specification Test for Fixed versus Random Effects Model – This test is devised by Hausman (1978) and states that under the zero correlation hypothesis, both FE and RE estimators are consistent, but FE estimators are inefficient. Under the alternative hypothesis, FE estimators are consistent but RE estimators are not.

Ho: $Cov(\mu_i, X_{it}) = 0$

H_A: $Cov(\mu_i, X_{it}) \neq 0$

Fixed effects model is preferred in case of rejection of the null hypothesis and alternatively the random effects model is preferred. The test is inappropriate in the presence of either heteroskedasticity or serial correlation, because then the variance formulae of the FE and RE estimators will be invalid. This is a big limitation of this test as it has been argued that in spite of practical considerations of the test, it should be based on robust covariance matrices that do not depend on assumptions of the random effects model. The suggested alternative approach to choose between these two models is variable addition test, which is described below.

(2) Mundlak's Approach – To allow for possible correlations between the explanatory variables and individual effects (in which case RE becomes inconsistent), Mundlak (1978) proposes to estimate following formulation as modified RE model:

$$y_{it} = \alpha + X'_{it}\beta + \bar{X}_i.\gamma + u_{it} \qquad i = 1,\ldots\ldots,N; \quad t = 1,\ldots\ldots, T \qquad (6)$$

where additional variables in the equation, $\bar{X}_i$, are individual means of all time varying variables.

The random effects model is dependent on the assumption of $E(\mu_i / X_{it}) = 0$. Hence, the approach suggest the specification: $E(\mu_i / X_{it}) = \bar{X}_i.\gamma$. Substituting this in

the panel regression equation (5) above, gives the Mundlak specification of RE model as in equation (6) above. This preserves random effects specification of the model but deals directly with problem of correlation of these unobserved individual effects and the regressors. Only time varying variables are included in this additional term of $\overline{X}_i.\gamma$.

The test of joint significance of the additional variables in this approach i.e. Ho: $\gamma = 0$ is a Wald test (F-test). This is asymptotically equivalent to the Hausman test of $Cov(\mu_i, X_{it}) = 0$, described above. The Mundlak test statistic is (as given in Greene, 2012):

$$M = \hat{\gamma}'[\text{Estimated Asymptotic Variance } (\hat{\gamma})]^{-1} \hat{\gamma}$$

If the test rejects Ho, Generalized Least Squares (GLS) using the un-augmented RE model is biased ⇒ FE model to be used. If the test doesn't reject Ho ⇒ GLS on the original model is applied. Mundlak (1978) has shown that if the individual effects are a linear function of the averages of all the time varying explanatory variables, then the GLS estimator of this model coincides with the FE estimator. It is hence, also frequently used as a compromise between the FE and RE models.

This model formulation also handles the above limitation of the Hausman specification of non-robust standard errors as it takes into account robust standard errors in estimation of random effects model to test for the joint significance of additional variables (Ho: $\gamma = 0$). The robust Newey-West standard errors correct for both heteroskedasticity and autocorrelation in u_{it}.

4.5.2 Panel Data 2SLS Estimation

The equations (1) to (4) above have endogenous variables on the RHS that are correlated with the error terms therefore, the estimates using FE and RE methods would be inconsistent. This is termed as 'simultaneity-bias'. The focus here is on the simultaneous equations model on panel data. The first equation of the model is given below (Baltagi, 2008):

$$y_1 = Z_1\delta_1 + u_1 \qquad (7)$$

where $Z_1 = [Y_1, X_1]$ and $\delta_1' = (\gamma_1', \beta_1')$. Y_1 is the set of g_1 right-hand side endogenous variables and X_1 is the set of k_1 included endogenous variables. One way error component model of the disturbances is taken given by u_1.

The leading method for estimating simultaneous equations models is the instrumental variable (IV) method such as two-stage least squares (2SLS) to obtain

consistent estimates of the parameters. The 2SLS method addresses problem of endogeneity of RHS variables with the help of an instrument determined by linear combination of all exogenous variables in the model.

To conduct 2SLS estimation in simultaneous equation framework, it is important to check whether each equation in the system is identified. Order condition of identification states that there must be at least G – 1 variables excluded from each equation, where G is equal to total number of endogenous variables (or simultaneous equations) in the system.[12] If it equals G-1, the equation is just identified, and if it exceeds then the equation is over identified.

There are two widely used instrumental variable (2SLS) methods for panel data: Fixed Effects 2SLS (FE2SLS) and Random Effects 2SLS (RE2SLS). These estimators are presented in Baltagi (2008). Both FE2SLS and RE2SLS methods assume that available instruments are uncorrelated with the error term for all time periods. Depending on whether or not these instrumental variables are correlated with unobserved effect, the choice is made between FE2SLS and RE2SLS. Hausman (1978) suggested a test for the comparison between FE and RE estimators in panel regression, to help choose between them. This test can be generalized to choose between FE2SLS and RE2SLS estimators (Baltagi, 2008). In the presence of endogenous RHS regressors like Y_1, the Hausman test of Ho: E ($u_1 \setminus Z_1$) = 0 is based on $\widehat{q_1} = \widetilde{\delta_1}_{.\text{FE2SLS}} - \widehat{\delta_1}_{.\text{RE2SLS}}$. The test statistic is:

$$m = \widehat{q_1}' [\text{var}(\widehat{q_1})]^{-1} \widehat{q_1} \sim \chi_r^2$$

where $\text{var}(\widehat{q_1}) = \text{var}(\widetilde{\delta_1}_{.\text{FE2SLS}}) - \text{var}(\widehat{\delta_1}_{.\text{RE2SLS}})$ and r denotes the dimension of the slope vector of the time varying variables in Z_1.

These 2SLS estimators are consistent but not fully efficient as they ignore cross-equation relationships between error terms and any omitted endogenous variables. 3SLS estimators use linkage among different equations and result in fully efficient estimators, but there are two limitations[13]. Baltagi (2008) proposed the estimation of

[12] The rank condition is both necessary and sufficient but is difficult to verify and hence the rule for identification is taken as fulfilling of the order condition. For details on the identification of system of equations, refer Greene (2012).

[13] Firstly, if any one equation in system has a specification error, the estimates of covariance of disturbances would be inconsistent and hence the coefficients estimates would be also biased and inconsistent. In comparison, if 2SLS method is used to estimate each equation separately, then only the coefficients of equation which is misspecified would be affected (i.e. estimates would be biased and inconsistent) and would not impact other coefficients and equations of the model. Secondly, finite-sample variation of the estimated covariance matrix is spread in the system and hence finite-sample variance under full information methods would be as large as or larger than under limited information

system of equations using the error components three-stage least-squares (EC3SLS) estimator, but this study considers only OLS and 2SLS estimators.

4.6 Analysis of the Regression Results

4.6.1 Panel Regression Results of the Four Structural Equations: OLS and 2SLS

The model given in equations (1) to (4) is estimated using panel data for 21 states of India for the years 1993-94, 2004-05, 2009-10 and 2011-12. The panel OLS estimation results of different equations are presented in Table 4.1 below.[14] The Fixed Effects specification has been chosen for each equation. The F statistic of state dummies is significant in FE specification of each equation.

It is important to note that in short panels where T is fixed and $N \rightarrow \infty$, the FE estimators of the individual effects ($\alpha + \mu_i$) are not consistent. This is because as $N \rightarrow \infty$, the number of fixed effects (μ_i) increases and are inconsistently estimated, as only T observations are used to estimate each parameter. This is termed as incidental parameter problem introduced by Neyman & Scott (1948) and is also discussed by Lancaster (2000). In some circumstances such as non-linear regression, binary variables regression etc., this would also lead to inconsistent estimates of the slope parameters. However, for linear regression models, the FE estimators of slope parameters (β), which are main parameters of interest, are consistent (Baltagi, 2008).

methods (Greene, 2012). Thus, there is trade-off between the potential cost of specification error and the gain in efficiency in using 3SLS estimators.

[14] The results of FE and RE specifications of each equation are given in Appendix 4.1. The choice between the two specifications is based on Hausman test and Mundlak formulation, which is also presented in the tables in Appendix 4.1. The Mundlak formulation is given preference over Hausman test wherever contradictory results emerge. This is because the test statistic of Mundlak formulation is based on robust covariance matrix estimator, as while Hausman test statistic is based on non-robust covariance matrix estimator.

Table 4.1: Panel Data OLS Estimates of the Four Structural Equations

	Equation for			
Explanatory Variables	**L. PI**	**L. PCNSDP**	**L. Trade**	**L. Gini**
L. PCNSDP	-1.3893 (-7.64)***		0.8577 (6.40)***	0.0602 (0.60)
L. Trade		0.6610 (3.87)***		-0.0683 (-0.55)
L. Gini	0.7377 (1.77)*	0.1264 (0.66)		
L. PC Government Expenditure	0.0152 (1.69)	0.0010 (0.07)		
L. PC Capital Expenditure			0.0261 (1.93)*	0.0149 (2.05)*
L. Share of Credit			0.1050 (0.62)	
L. Share of Agriculture	-0.2133 (-1.14)			
L. Population Growth Rate	-0.0695 (-0.81)		0.0381 (0.79)	-0.0040 (-0.15)
L. Working Population Proportion		0.4723 (1.52)		
L. Proportion of Graduates		0.2372 (1.78)*		0.1290 (1.78)*
L. Inflation	0.0538 (1.17)	0.0658 (2.20)**	-0.0220 (-0.69)	-0.0273 (-2.09)**
Constant	15.3349 (5.50)***	5.0527 (3.81)***	-5.813 (-6.75)***	2.8027 (3.63)***
Year Dummies	No	No	No	No
Test Statistic for Joint Significance of Slope Coefficients	F(6,20) = 97.94 Prob > F = 0.00	F(6,57) = 99.38 Prob > F = 0.00	F(5,20) = 104.32 Prob > F = 0.00	F(6,57) = 6.86 Prob > F = 0.00
R square	0.80	0.91	0.90	0.42
Selected Model	**FE**	**FE**	**FE**	**FE**
F Statistic for state dummies	F(20, 57) = 5.30 Prob > F = 0.00	F(20, 57) = 8.43 Prob > F = 0.00	F(20, 58) = 18.99 Prob > F = 0.00	F(20, 57) = 4.31 Prob > F = 0.00
Observations	84	84	84	84
No. of States	21	21	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The numbers in parentheses are 't' statistic corresponding to robust standard errors.
The R square is within R square.

The estimates of the poverty equation support the general consensus of economic growth leading to reduction in poverty levels, with the elasticity of -1.4. The incidence of poverty is positively affected by inequality i.e. higher inequality leads to higher poverty incidence, the elasticity being less than unity at 0.74. Per capita government expenditure, inflation, share of agriculture in GSDP and rate of growth of population are not significantly influencing the incidence of poverty. The within R square is 0.80.

The second equation shows that PCNSDP is positively and significantly impacted by trade openness (elasticity value of 0.66), proportion of graduates and above in the population (elasticity of 0.24) and inflation (elasticity of 0.07). However, per capita government expenditure and proportion of working population are not found to be significant.[15] Also, the measure of inequality i.e. Gini coefficient is not found to be significantly impacting PCNSDP. The within R square is also high at 0.91.

The estimates of third equation for trade openness show that PCNSDP and per capita capital expenditure positively and significantly affect trade openness. The respective elasticity values are 0.86 and 0.03. The other explanatory variables - share of credit, rate of growth of population and inflation - are not significantly impacting trade openness. The within R square is 0.90.

In the results of fourth equation of inequality however, coefficients of per capita capital expenditure, proportion of graduates and above in population and inflation, are significant (elasticity values of 0.02, 0.13 and -0.03, respectively). No other variable included in the equation (PCNSDP, trade and rate of growth of population) is significant. The within R square is also low at 0.41.

As stated earlier, the OLS estimates (given in Table 4.1) are subject to simultaneity bias. The 2SLS estimates of the four structural equations are presented in Table 4.2[16].

[15] Per capita capital expenditure was also incorporated in the model but due to its high correlation with government expenditure (correlation coefficient of 0.97), it was dropped from this equation.

[16] The results of FE and RE specifications, along with Hausman test to choose final model for each equation are given in Appendix 4.2.

Table 4.2: Panel Data 2SLS Estimates of the Four Structural Equations

	Equation for			
Explanatory Variables	**L. PI**	**L. PCNSDP**	**L. Trade**	**L. Gini**
L. PCNSDP	-1.2233 (-4.51)***		0.9755 (9.16)***	-0.0855 (-0.80)
L. Trade		1.3937 (4.50)***		-0.1426 (-1.06)
L. Gini	-0.5577 (-0.67)	-0.3913 (-0.43)		
L. PC Government Expenditure	0.0271 (1.24)	-0.0063 (-0.30)		
L. PC Capital Expenditure			0.0143 (0.92)	0.0178 (1.70)*
L. Share of Credit			-0.0045 (-0.04)	
L. Share of Agriculture	-0.2817 (-1.92)*			
L. Population Growth Rate	-0.0615 (-0.81)		0.0343 (0.79)	-0.0260 (-0.97)
L. Working Population Proportion		0.6570 (0.99)		
L. Proportion of Graduates		-0.2228 (-0.93)		0.2744 (1.96)**
L. Inflation	0.0042 (0.05)	-0.0232 (-0.33)	-0.0261 (-0.71)	-0.0008 (-0.02)
Constant	18.2530 (7.46)***	4.4621 (1.46)	-6.5667 (-9.25)***	4.2661 (3.83)***
Year Dummies	No	No	No	No
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(6) = 179.5 Prob > chi2 = 0.00	Wald chi2(6) = 334431 Prob > chi2 = 0.00	Wald chi2(6) =61414 Prob > chi2 = 0.00	Wald chi2(6) = 46.05 Prob > chi2 = 0.00
R square	0.69	0.84	0.34	0.31
Selected Model	**RE**	**FE**	**FE**	**RE**
Observations	84	84	84	84
No. of States	21	21	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with non-robust standard errors are reported for FE and RE models, respectively.
The reported R square is within R square for FE models and overall R square for RE models.

The 2SLS results are not too different from the OLS results. For poverty equation, PCNSDP is the main significant determinant with a high elasticity value of -1.22 (increases from -1.4 in OLS estimates). Apart from this, the only variable significantly impacting poverty incidence is share of agriculture in GSDP (coefficient of -0.28). The coefficient of Gini is positive and significant in OLS estimates but the 2SLS coefficient is not significant. The selected specification changes from FE in OLS to RE in 2SLS results. The R square is 0.69.

However, for the equation for PCNSDP there are differences in estimates. The only variable which is significant in 2SLS estimates is trade openness with a much higher elasticity of 1.39. The coefficients of two variables namely, proportion of graduates and above in population and inflation, which are significant in OLS estimates, turn insignificant. All other variables are also insignificant. The chosen model is FE and the within R square is still high at 0.84.

The 2SLS results of trade equation reveal the similarity with OLS estimates in terms of signs of the coefficients and their significance, except for per capita capital expenditure which turns insignificant. The only variable significantly affecting trade openness in 2SLS estimates is PCNSDP, with a coefficient (or elasticity) of 0.97 (this was 0.86 in OLS results of trade equation). The coefficient of share of credit, though insignificant is positive in the OLS estimates but is negative in 2SLS estimates. The chosen model is FE and the within R square is 0.34.

The 2SLS results of equation for inequality reveal that only two variables positively and significantly impact the Gini coefficient - per capita capital expenditure (coefficient of 0.02) and proportion of graduates and above in the population (coefficient of 0.27). Inflation which is negatively and significantly affecting inequality in OLS results is insignificant in 2SLS results. The model chosen is RE (was FE in OLS results) and R square is 0.31.

The above results, hence, support the main hypothesis of the chapter that trade openness leads to poverty reduction via its influence on growth and inequality. Inequality, (at least empirically shown) is not playing a significant role in affecting per capita income, trade openness or poverty incidence, as the coefficients are found to be insignificant. The total effect (both direct and indirect) of any variable X on poverty can be obtained by two components: (a) the estimated elasticity of X in the poverty equation and (b) the elasticities of other variables in the poverty equation that are affected by X (Bathla et.al. 2015 and Imbs, 2004). Thus, the total effect of trade

openness on poverty is calculated from simultaneous equation model equations (1) to (4) given in section 4.3, using the formula: [17]

$$\frac{dPoverty}{dTrade} = \frac{\partial Poverty}{\partial PCNSDP}\left(\frac{\partial PCNSDP}{\partial Trade}\right) + \frac{\partial Poverty}{\partial PCNSDP}\left(\frac{\partial PCNSDP}{\partial Gini} * \frac{\partial Gini}{\partial Trade}\right) + \frac{\partial Poverty}{\partial Gini}\left(\frac{\partial Gini}{\partial Trade}\right)$$

The total effect of trade openness on poverty incorporating only indirect effect (as there is no direct effect) is thus, equal to -1.64 from 2SLS results. If only significant effects are taken into account in the calculation, then only first term will be non-zero and hence trade elasticity of poverty would be equal to -1.7. Thus, with such a high elasticity, trade openness is expected to play a significant role in poverty reduction through its impact on per capita income of the states.

4.6.2 Panel Regression Results of the Model of the Direct Impact of Trade Openness on Poverty: OLS and 2SLS

To check for the direct impact of trade openness on poverty incidence, the same specification of the equation for poverty is estimated again after including trade openness as an additional endogenous RHS variable. The panel data OLS and 2SLS estimation results are given in table 4.3 below. [18]

[17] Note that this calculation of the impact of trade openness on poverty can only be taken as impact effects including both indirect channels into account (as there is no direct channel of effect in the model) but omitting the feedback effect from PCNSDP (as this omits the feedback effect from PCNSDP to trade and from PCNSDP to inequality).

[18] The results of the FE and RE specifications, along with Hausman and Mundlak tests, to choose the final model for OLS and 2SLS estimation are given in Appendix 4.3.

Table 4.3: Panel Data OLS and 2SLS Estimates of the Poverty Equation: Trade Openness included as RHS variable

Dependent Variable : Log of Poverty Incidence		
Variables	**OLS Estimates (1)**	**2SLS Estimates (2)**
L. PCNSDP	-1.0605 (-3.70)***	-1.1182 (-4.53)***
L. Trade	-0.3765 (-1.49)	-0.1366 (-0.71)
L. Gini	0.7628 (1.57)	-0.4303 (-0.54)
L. PC Government Expenditure	0.0210 (2.29)**	0.0271 (1.24)
L. Share of Agriculture	-0.2311 (-1.35)	-0.2631 (-2.06)**
L. Population Growth Rate	-0.0593 (-0.80)	-0.0517 (-0.68)
L. Inflation	0.0499 (1.07)	0.0164 (0.19)
Constant	13.1912 (3.82)***	17.1370 (7.01)***
Year Dummies	No	No
Test Statistic for Joint Significance of Slope Coefficients	F(7,20) = 101.85 Prob > chi2 = 0.00	Wald chi2(7) = 181.79 Prob > chi2 = 0.00
R square	0.81	0.69
Selected Model	**FE**	**RE**
Observations	84	84
No. of States	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with robust (non-robust) standard errors are reported for OLS (2SLS) FE and RE models, respectively.
The reported R square is within R square for FE models and overall R square for RE models.

The results above refute the existence of direct impact of trade openness on poverty incidence. The coefficient of trade openness though negative (supporting the hypothesis) is not significant. In both OLS and 2SLS estimates, the most important variable affecting poverty incidence is PCNSDP, with a significant coefficient value of -1.1. Inequality is also not significantly impacting the poverty incidence. The share of agriculture is found to be significantly reducing poverty incidence in 2SLS estimates, whereas per capita government expenditure is found to be increasing poverty incidence in OLS estimates.

The result of no significant direct effect of trade openness on poverty incidence, is not in conformity with the findings of other studies on the Indian economy analysing

this relationship at sub national level.[19] Hasan, Mitra & Ural (2007) analysed the effect of trade openness on poverty incidence of the states and found the coefficient to be 0.75 (i.e for one percentage reduction in the tariff rate, poverty reduces by 0.75 percent). However, with a control for per capita development expenditure, the coefficient reduced, implying an overestimation of the effect of trade liberalization on poverty due to omitted variables. Cain et.al. (2010b) reported a much lower estimate of 0.57. Topalova (2005), however, following a similar approach (for the districts of India), found that trade liberalization led to poverty increase for rural areas (coefficient of -0.69) but no statistically significant relationship was found for urban India. The results did not change and the coefficient dropped only slightly when other district level characteristics were added.

In contrast, the present exercise differs with respect to control variables included in the regression; trade openness defined as outcome measure and data has been extended by two latest NSSO survey rounds of 2009-10 and 2011-12. This could be the reason for differences in empirical results. Also, PCNSDP is included as one of the control variables in our regression equation. As it is found to be the main determinant of poverty incidence, other variables namely, trade openness, inequality, inflation etc. are not found to be significantly impacting poverty.

The results in table 4.3 however, are in conformity with the previous set of 2SLS estimates (which does not include trade openness as RHS variable) given in table 4.2. PCNSDP has the highest coefficient values, which are also very close in both sets of 2SLS estimates (coefficient values being -1.1 and -1.2 respectively). Another variable found to be significant is the share of agriculture and again coefficient values are very close at -0.26 and -0.28 respectively.

The comments on Hasan et.al (2007) given by Kenneth Kletzer (in the same paper) states, “It is tempting to place this research in the context of cross-country estimates showing that trade raises growth rates and growth in turn reduces the incidence of poverty. However, directly regressing poverty rates on measures of trade protection skips over the means through which trade reforms affect income growth and poverty.” Hence, analysing the direct impact of trade openness on poverty does not allow to study the inter relationships among trade openness, income, inequality and

[19] The studies, however, ignored the problem of endogenity bias and relied only on panel data OLS estimation results.

poverty. Moreover, panel data OLS estimates do not account for the endogeneity of RHS variables. Hence, model comprising of four structural equations estimated with 2SLS methodology (which also give consistent estimates) are the preferred estimates, and are discussed in detail below.

4.6.3 Discussion of Regression Results

The simultaneous equations model (equations 1 to 4 above) depict the important interdependencies among the four endogenous variables. These are indicated in Table 4.4 below depicting the relations found to be significant/insignificant in both OLS and 2SLS estimates.

Table 4.4: Significance of Relationships between the Endogenous Variables of the Model

	Equation For							
RHS Endogenous Variables	**PI**		**PCNSDP**		**Trade**		**Gini**	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
PCNSDP	√	√			√	√	n.s	n.s
Trade			√	√			n.s	n.s
Gini	√	n.s	n.s	n.s				

Notes: Coloured boxes depict inter relationships of four endogenous variables in the model
√ Depicts significant relations.
n.s implies non-significant relations.

The nature of significance of coefficients depicting inter-relationships between endogenous variables is the same in both OLS and 2SLS results, except in one case. The 2SLS estimates of these coefficients are higher than OLS estimates. These relationships are robust to the inclusion of state fixed effects in the empirical analysis, implying that both within states and across states, these associations exist.

The first important relationship is responsiveness of poverty to increase in per capita income. This is a well-established hypothesis. Much evidence points in the direction of how growth is essential for poverty reduction. Dollar & Kraay (2002 & 2013) in their cross-country regressions concluded that income of bottom 20% grows at the same rate as overall average income of total population and hence whatever be the nature of growth, it is beneficial for the poor.

Ravallion & Datt (1996) estimated the elasticity of poverty with respect to net domestic product per capita of India to be -0.75 (using data from 1958 to 1991), thus stating that prior to 1990s economic growth had typically been poverty reducing in India. However, later studies of Datt & Ravallion (2011) and Datt, Ravallion & Murgai

(2016) found the elasticity for longer periods of 1958 – 2006 and 1957 – 2016 to be -0.65 and -0.82, respectively. The former study found post 1991 elasticity to be lower at -0.49 than pre 1991 elasticity of -0.73. However, the latter study (extending the period till 2016) reported a reverse trend with post 1991 elasticity at -1.24 and pre 1991 at -0.67. Radhakrishna et.al. (2013) estimated growth elasticity of poverty to be -0.33, in a regression framework for the states of India for the period of 1993-94 to 2009-10. Our results show that the elasticity of poverty with respect to per capita NSDP is -1.22 for the period of 1993-94 to 2011-12.

The results above show that Gini coefficient is neither affecting PCNSDP, nor getting affected by it. It is also not impacting poverty incidence in 2SLS results (OLS estimates being significant). Many studies employing cross-section data (listed in Benabou, 2000) confirm the Kuznets Hypothesis of negative impact of growth on inequality on. However, Radhakrishna et.al (2013), estimated impact of GDP on inequality of the states of India for the period of 1993-94 to 2009-10, found the coefficient to be significant and elasticity value of 0.27. Perotti (1996) in a study for 67 countries found that higher inequality generated lower growth in income. However, studies using panel data have refuted this argument. Forbes (2000) repeated Perotti study by incorporating panel data estimation and found that inequality increases growth in the short run and medium run. Barro (2000) refuted both these arguments and found no relation between the two. However, when the analysis was conducted separately for poor and rich countries, negative (positive) relation between inequality and growth for the sample of poor (rich) countries was found. According to the World Development Report (2006), growth has on average no impact on inequality. Several methodological problems like OLS results being inconsistent in the presence of endogeniety; measurement error bias and omitted variable bias, explain the apparent difference between the empirical results of different studies. Banerjee & Duflo (2003) attempted to explain this contrasting evidence for both sets of studies (using either cross section or panel data) stated that there exist a non-linear relation between growth and inequality.

Our results show absence of significant causal relationships between PCNSDP and inequality and hence inequality is not expected to adversely affect poverty. According to Bourguinon (2003), inequality would not adversely affect the reduction in poverty if the country's positive growth impacts are large enough to offset the negative impacts of inequality. Studies have shown that the rate of poverty reduction is

slower in countries with the same rate of growth of GDP but with higher levels of inequalities. Ravallion (1997) used data for twenty-three developing countries and found evidence for the same.

Many observers have noted increase in inequality in the Indian economy and considered it to be one of the important factors dampening the impact of growth on poverty especially in the post liberalization period. Topalova (2005) and Radhakrishna et.al (2013) claimed that poverty reduction would have been much higher at all India level as well as for urban and rural areas of India, if inequality had not been growing at such a high rate.

Another important relationship for the present analysis is between trade openness and per capita income, which is a two way relation. The results above show that this relationship is found to be positive and significant with the high elasticity of 1.4. Hence, states that are more open have experienced higher per capita incomes. The reverse causality between trade openness and per capita income is also found to be positive and significant with the elasticity of 0.98. So, it is not only that trade openness promotes growth, but also higher per capita income pushes up trade.

As already discussed, the evidence is mixed on the relation between trade openness and income growth in India. Chandra (2002, 2003) and Dhawan & Biswal (1999) largely employed time series data and supported the two way causality of these variables (more so between income and export growth). Chatterji et. al. (2013), Marelli & Signorelli (2011) and Paul & Das (2012), studying the period of post 1980s, found supporting evidence of the positive relation between trade openness and growth.

One important point to note is that the estimated values of both sides of causal relations between trade openness and per capita NSDP are higher for panel data 2SLS results than panel data OLS results. The point estimates imply that a one percentage increase in trade share leads to 1.4 percent increase in PCNSDP in 2SLS estimates and to 0.67 percent increase in OLS estimates. The increase is much lower in the reverse causal relations, where the coefficient increases to 0.98 in 2SLS estimates from 0.86 in OLS estimates. Thus, one can say that states with higher trade as a proportion of GDP experience higher incomes per capita, even after controlling for the endogeneity of trade.[20]

[20] Frankel & Romer (1999), in their cross-section study of 150 countries for the year 1985, found the similar pattern in OLS and IV estimates of the coefficient of trade openness on per capita income. Irwin & Tervio (2002) also checked for the consistency of results of Frankel & Romer (1999) and found that

The impact of trade openness on inequality is not found to be significant. In a cross sectional study for the period of 1981 – 2013, Mitra (2016) found that trade as a percentage of GDP had insignificant impact on inequality but tariff reductions led to increase in inequality. These results remained consistent even when country effects and time effects were included in the regression. A reduction in average tariffs by one percentage led to increase in Gini coefficient by 0.048. In India, average tariffs reduced by 72 percentage points, which would have increased inequality by about 3.5 points. However, Gini coefficient increased by 2 points only during this period, implying that this smaller increase may be due to other redistributive polices followed in the economy.

But in a study by Krishna & Sethupathy (2011), which focussed on the states of India and incorporated Theil measure of inequality (and not Gini coefficient), the impact of tariffs on inequality was not found to be significant. Topalova (2005) looked at the impact of protection on inequality at the district level for India, also supported this argument of no significant relationship between tariffs and inequality.

4.6.4 Estimated Reduced Form of the Four Structural Equations

The reduced form coefficients give the effect of a unit change in given exogenous (predetermined) variable on the relevant endogenous variable of the model. These estimates are given in Table 4.5 below. The 2SLS results above show that out of four equations of the model, two are estimated by the FE2SLS method and other two by the RE2SLS method (chosen according to Hausman test). However, for calculating the reduced form estimates, all four equations are estimated by the RE2SLS method. This is done to obtain one set of coefficients of the effects of exogenous variables on each endogenous variable (as these coefficients vary with the method of estimation followed for structural estimation). Hence, the following reduced form estimates should be used to analyse the direction and significance of effects of exogenous variables (keeping in mind that the equations are estimated by the RE2SLS method).

instrumenting trade openness led to higher positive effect of trade openness on per capita income. However, they stated that this implied that either trade openness was not measured correctly and/or it was not a good proxy for other factors that increased income due to interactions between nations.

Table 4.5: Reduced Form Estimates based on Panel Data RE2SLS Estimates of the Four Structural Equations

	Equation For			
Explanatory Variables	**L. PI**	**L. PCNSDP**	**L. Trade**	**L. Gini**
L. PC Government Expenditure	-0.2070 (-1.78)*	-0.0280 (-0.39)	0.2000 (2.38)**	0.0723 (1.98)**
L. PC Capital Expenditure	0.2473 (1.72)*	0.0609 (0.69)	-0.2368 (-2.28)**	-0.0679 (-1.51)
L. Share of Credit	0.2376 (1.67)*	-0.0834 (-0.94)	-0.1896 (-1.84)*	0.1112 (2.42)**
L. Share of Agriculture	0.0896 (0.86)	-0.2495 (-3.87)***	-0.0945 (-1.25)	0.0109 (0.33)
L. Population Growth Rate	-0.0056 (-.08)	-0.0118 (-0.26)	-0.0542 (-1.00)	-0.0182 (-0.77)
L. Working Population Proportion	-2.3912 (-3.31)***	1.7752 (3.97)***	-1.4246 (-2.73)***	-0.1440 (-0.63)
L. Proportion of Graduates	-0.9438 (-6.28)***	0.6381 (6.92)***	0.6095 (5.60)***	0.0781 (1.66)*
L. Inflation	-0.0504 (-0.72)	0.1059 (2.52)**	0.1402 (2.79)***	-0.0571 (-2.64)***
Constant	13.7440 (4.49)***	2.4544 (1.30)	9.0186 (4.07)***	3.4938 (3.59)***
Year Dummies	No	No	No	No
Wald Chi2 (8) Prob > Ch2	183 0.00	561 0.00	251 0.00	73 0.00
Observations No. of States	84 21	84 21	84 21	84 21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively. The numbers in parentheses are 'z' statistic with non-robust standard errors.

Two important determinants of poverty incidence emerging from reduced form estimates are proportion of working population and proportion of population with educational qualification of graduation and above. Both variables lead to reduction in poverty incidence with high and significant coefficient values of -2.4 and -0.94 respectively. Per capita government expenditure also significantly impacts poverty reduction whereas per capita capital expenditure and share of credit are shown to increase poverty incidence. Share of agriculture, population growth rate and inflation are not significantly impacting poverty incidence.

PCNSDP gets significantly impacted by the proportion of working population, with the highest coefficient of 1.8. The other significant variables in the reduced form are: proportion of graduates and above in the population and inflation, positively impacting it and the share of agriculture sector in GDP negatively impacting it.

For the trade openness equation, all exogenous variables except population growth rate and share of agriculture sector in output are found to be significant. Per capita government expenditure, proportion of graduates and above in population and inflation are positively impacting trade openness whereas, per capita capital expenditure, share of credit and proportion of working population are negatively affecting it.

For the inequality equation, the coefficients of per capita government expenditure, share of credit and proportion of graduates are positive and significant and the coefficient of inflation is negative and significant. Thus, government expenditure, share of credit and higher education of the population lead to increase in inequality.

One variable playing an important role is the proportion of graduates and above in the population. This factor is relevant in determining all four endogenous variables. It increases PCNSDP, trade openness, inequality but reduces poverty incidence. Kotwal & Chaudhuri (2016) and Cain et.al. (2010b) have also shown that the returns for higher education have been increasing in India, especially the educational premium for graduates increased continuously from 1993 to 2009. Work participation rate (working population proportion) also plays an important and positive role in increasing PCNSDP and reducing poverty incidence. Another important exogenous variable is inflation which not only positively influences PCNSDP and trade openness but also negatively influences inequality (though not found to impact poverty incidence). The fiscal policy of the government depicted by per capita government expenditure is shown to positively impact poverty incidence, trade openness and also inequality.

4.6.5 Validation and Robustness of Results

Two validation tests are performed to assess the acceptability and fitness of the model. An important test for validity of instruments used in 2SLS estimation procedure is the F-statistic for first stage regression. For RE2SLS estimation, the equivalent one is the first stage Wald statistic and it is given in Table 4.5 above. The value of test statistic is high and hypothesis that all coefficients are zero in first stage regression is rejected (as Prob > Chi2 is equal to 0) for all the endogenous variables.

The ex-post or historical estimation of endogenous variables is also conducted. The measures used to compare original data series with estimated data series are given below in Table 4.6 below. The results seem reasonable. The Root Mean Squared Percent Error (RMSE %) is the most widely used measure of the goodness of fit. The

figures are not very high except for trade openness. Normalised RMSE corrects for the outliers and is also a better measure to compare the results of four endogenous variables as it is not affected by the units of measurement of the variables. The overall results are fine and seem to be within acceptable limits. Here again the figure for trade openness is relatively higher than for other series.

Table 4.6: Validation Statistics of Panel Data 2SLS Estimates of the Four Structural Equations

	L. PI	**L. PCNSDP**	**L. Trade**	**L. Gini**
RMSE %	11.41	5.57	14.26	3.53
Normalised RMSE	0.1422	0.1893	0.3048	0.1680

To check for robustness of the results (given in table 4.2), the simultaneous equations model with only three equations - (1) to (3) - is estimated by treating inequality as an exogenous variable in the model (i.e. inequality equation is not considered). The 2SLS results of the remaining three equations (given in Appendix 4.4) are not found to be very different from previous results. Thus, exclusion of inequality is not making much difference to the results. This is to be expected as inferred from table 4.4, where significance of coefficients depicting inter-relationships between endogenous variables were considered. Inequality is not significantly affecting other endogenous variables (per capita income, trade openness or poverty incidence) and also not significantly getting impacted by them (per capita income and trade openness) in the 2SLS results (where it was taken as an endogenous variable).

Another robustness check is conducted by introducing year dummies to capture year-specific (cyclical) effects. The year dummies are added for the years 1993-94, 2004-05 and 2009-10. The results of 2SLS estimates with year dummies (given in Table 4.7 below) are significantly different from results in table 4.2.

Table 4.7: Panel Data 2SLS Estimates of the Four Structural Equations: With Year Dummies

	Equation For			
Explanatory Variables	**L. PI**	**L. PCNSDP**	**L. Trade**	**L. Gini**
L. PCNSDP	-0.9612 (-3.82)***		0.0767 (0.45)	0.0034 (0.04)
L. Trade		0.0870 (0.19)		-0.4054 (-1.28)
L. Gini	-0.2234 (-0.36)	0.2509 (0.51)		
L. PC Government Expenditure	0.0103 (0.56)	-0.0055 (-0.41)		
L. PC Capital Expenditure			-0.0014 (-0.13)	0.0127 (1.17)
L. Share of Credit			-0.0500 (-0.64)	
L. Share of Agriculture	-0.1400 (-1.09)			
L. Population Growth Rate	-0.0458 (-0.75)		0.0412 (1.42)	-0.0089 (-0.27)
L. Working Population Proportion		0.4871 (0.57)		
L. Proportion of Graduates		0.0469 (0.32)		0.1746 (2.02)**
L. Inflation	0.1526 (1.56)	0.0146 (0.29)	-0.0017 (-0.05)	-0.0404 (-0.95)
Year1	0.2313 (1.91)**	-0.7269 (-2.19)**	-0.8586 (-6.09)***	-0.2913 (-1.07)
Year2	0.4060 (3.98)***	-0.3703 (-1.72)*	-0.4405 (-5.16)***	-0.1537 (-1.11)
Year3	0.1904 (2.41)**	-0.1195 (-1.24)	-0.1941 (-5.46)***	-0.0343 (-0.49)
Constant	13.6840 (5.59)***	7.3021 (1.77)**	3.2114 (1.86)**	4.6437 (3.58)***
Test for significance of year dummies	Prob > F = 0.00	Prob > F = 0.07	Prob > F = 0.00	Prob > F = 0.49
R square	0.76	0.93	0.96	0.18
Selected Model	**RE**	**FE**	**FE**	**RE**
Observations	84	84	84	84
No. of States	21	21	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with non-robust standard errors are reported for FE and RE models, respectively.
The reported R square is within R square for FE models and overall R square for RE models.

With the introduction of time effects in the model, all relations turn to be insignificant except the impact of PCNSDP on poverty incidence and impact of proportion of graduates and above on inequality. The year dummies are significant in all equations except for the inequality equation. The three year dummies are leading to increase in poverty incidence and fall in PCNSDP and trade openness. Furthermore, introduction of year dummies increases the explanatory power of equations, as R square increases for all except for the equation for inequality. Year dummies and constant in the equations have captured explanatory power of the variables. This was expected as most of variables included in the model are macro-economic variables with a strong cyclical component.

Thus, when time fixed effects are added to the model, the results become implausible. It implies that these relations are not found to be important within a time period but across time periods those relations are important. Given the timing of trade reforms to be the same for the country as a whole, it does not leave much variation in trade openness across states to capture its effects. For the inter relationships amongst four endogenous variables, the two way causality between trade and PCNSDP disappears with time dummies. It is possible that both trade openness and PCNSDP are correlated with other variables which are omitted from the model. However, the impact of PCNSDP on poverty and the impact of proportion of graduates and above on inequality remain significant. The former is an established hypothesis and for the later, it has been shown in many studies that educational premium for graduates has been significantly increasing since the decade of 1990s for India. It is an important take away from these results.

However, with the introduction of state and / or year dummies, the systematic variation in regressions get reduced and as a result there is domination of errors of measurement in estimation of the coefficients. The data is also available only for four years and therefore, it would be better to focus analysis on 2SLS estimates without time dummies, for magnitude of effects considered in the model.

4.7 Summary and Conclusion

This chapter attempts to empirically examine the impact of trade openness on poverty. It builds on PGI triangle proposed by Bourguignon (2003) to determine the impact of trade openness on poverty through its effects on growth and inequality and examine the inter relations among these four relevant variables. The simultaneous

equation model consisting of a system of four equations (1) to (4) given in section 4.3, for poverty (PI), per capita net state domestic product (PCNSDP), trade openness (Trade) and inequality (Gini) is estimated from panel data for 21 major states in India.

OLS and 2SLS estimates of the four equations are presented and some differences are noticed. The 2SLS estimates of structural equations and their reduced form estimates are analysed to understand not only the inter linkages among the endogenous variables but also how the exogenous variables affect each endogenous variable.

The key relations (amongst endogenous variables) emerging from the empirical analysis are as follows:

(1) There is a negative relation between PCNSDP and poverty incidence and hence the higher the PCNSDP of a state, the lower is its poverty incidence.

(2) There is a positive association between trade openness and PCNSDP. So the states which are trading more, experience higher PCNSDP. Also, PCNSDP positively influences trade openness.

(3) The poverty equation is also re-estimated to check for presence of direct relationship between trade openness and poverty incidence by both OLS and 2SLS methods and no direct significant impact of trade openness on poverty is found.

From these three statements, one can conclude that trade openness leads to poverty reduction through its positive impact on growth.

(4) The two way relation between PCNSDP and inequality is not found to be significant.

(5) The relation between trade openness and inequality is also not found to be significant.

Thus, trade openness of the states would not affect inequality and through it would also not have either a positive or negative impact on PCNSDP and hence poverty. This channel with the possibility of negative impact on poverty is not found to be significant in the results. Hence, one can say with some confidence that trade openness through its impact on PCNSDP (and no impact on inequality from either trade openness or PCNSDP) would be beneficial for reduction in poverty incidence.

However, one needs to be careful in interpreting this result of no impact of inequality on income and poverty incidence. Though poverty ratio has fallen in India, the number of poor have gone up over the years. According to Nayyar (2013), this trend has been observed in both Africa and Asia (despite rapid economic growth). This is because countries that have experienced higher growth have also observed rise in all

forms of economic inequalities, particularly the two large growing nations of India and China. The literature also points to a non- linear relation between PCNSDP and inequality, which has not been tested in this study. According to it, inequality negatively influences per capita income after a certain level of growth and in that case, higher inequality would adversely affect not only growth but also poverty incidence. Thus it would be imperative for the economy to control the rising inequality. If it remains unchecked, it can become detrimental for the growth prospects of the economy and eventually can arrest the observed fall in poverty.

The 2SLS results fail, to an extent, on the robustness test of inclusion of year dummies in the model. Two relations i.e. the negative coefficient of PCNSDP in the equation for poverty incidence and the positive coefficient of proportion of graduates and above in population explaining inequality, remain significant. The coefficients of most of variables become insignificant in the presence of time dummies, which capture explanatory power of variables. This was expected given the nature of the model and variables incorporated; still the results have to be interpreted with caution, taking this aspect into consideration. However, 2SLS estimates without time dummies appear to be more plausible and hence are preferred.

The majority view of the literature as well as the present empirical analysis point towards the importance of trade liberalization for growth and poverty reduction. But it is desirable not to place too much emphasis on globalization and exports as an easy path to rapid economic growth and development. Rodrik et.al. (2004) have shown the importance of domestic strategy, which includes building institutions and focussing on human and physical investment, to fully exploit the beneficial effects of trade openness. Thus, Rodrik et.al. (2004) concluded that openness is a means to an end and not an end in itself. Accordingly, the reduced form estimates of the four equation model are also presented to show how exogenous variables affect each endogenous variable.

Proportion of working population has the highest impact for PCSNDP and poverty incidence. Proportion of graduates and above in the population leads to reduction in poverty incidence and increase in PCNSDP, trade but also increases inequality. Fiscal policy of the government depicted by per capita government expenditure positively impacts trade and poverty, though it leads to increase in inequality. These are important factors to concentrate on to achieve the objective of poverty reduction in India.

The empirical exercise of the chapter suffers from a few limitations. Firstly, the empirical analysis is conducted for the states as entities, with rural-urban distinction ignored as data are not available separately for rural and urban areas of the states of India. There are huge differences with respect to poverty and inequality between rural and urban areas and the present analysis fails to bring in that dichotomy in the analysis. Secondly, the model assumes log-linear relations between all variables. There is scope for further research on the model incorporating non-linearity and rural – urban differences.

After empirically examining the effect of trade openness on poverty via the channel of growth, the study further examines the second channel (static channel) i.e. through factor (labour) markets. The two aspects of this channel namely, the impact of trade openness on unemployment rate and wage inequality are covered in next two chapters of the study.

Chapter 5

Trade Openness and Unemployment

5.1 Introduction

This and the following empirical chapter of the study try to analyse the relation between trade openness and poverty through labour market channel by looking at the impacts on unemployment and wage inequality, respectively. Kruger (1983) in a study based on developing countries had emphasized the importance of factor market effects for analysis of trade, trade policy and poverty, specifically impacts of trade on employment and wages. The unemployment of a country is associated with higher probability of poverty and hence, analysing change in employment due to trade liberalization is an important link for studying the impact on poverty. This chapter thus tests the hypothesis that trade liberalization leads to decrease in unemployment which would then have a positive effect on poverty reduction.

There are various studies looking at the relationship between trade and employment / unemployment. Some studies found that higher trade openness decreases unemployment such as Felbermayr et.al. (2011b), Bassanini & Duval (2006, 2009), Nickell et.al. (2005) and Blanchard & Wolfers (2000). The other set of studies such as Helpman & Itskhoki (2010), Janiak (2006), Sener (2001) and Moore & Ranjan (2005), provided opposite results and argued that lower trade barriers led to a rise in unemployment. A detailed survey and analysis of these studies is provided in chapter 2. Different approaches have been undertaken to examine this relationship and the overall evidence as to whether trade liberalization leads to fall in unemployment is ambiguous. But one general conclusion emerges that country specific effects are important and hence, country case studies are more relevant in this area. One important shortcoming found in the existing studies is the focus on manufacturing employment, leaving out agriculture and services sector. It is difficult to say that the results based on manufacturing can be generalized to other sectors as well.

The aim of this chapter is to empirically analyse the relationship between trade openness and unemployment using data for Indian states (separately for rural and urban areas). This serves as an important channel for the reduction in poverty as a result of trade openness. As a country opens to international trade and exports more labour-intensive goods (in case of developing countries like India), the demand for labour

increases. Poverty is usually concentrated in the people who are either potential part of the labour force or are at the bottom end. Thus, the increase in labour demand in developing countries would help alleviate their poverty. The period of trade liberalization beginning in 1991 is considered. The analysis is thus, based on data from the five thick rounds for the years 1993-94, 1999-00, 2004-05, 2009-10 and 2011-12 of Employment and Unemployment surveys of NSSO.

A study by Krugman (1995) on the European countries argued that in most countries trade led to higher unemployment and emphasized that one of the main factors behind the differential effects of trade are the differences in labour market institutions in these countries. The labour market institutions have been neglected in past but more recently studies have recognised their importance. The empirical analysis of the chapter hence, also takes into account labour market institutions of the states of India.

The chapter is structured as follows: Section 5.2 presents a review of literature focussing on the empirical studies for the Indian economy. Section 5.3 presents in detail econometric model adopted, to empirically test the hypothesis of this chapter. Section 5.4 provides definitions of variables included in the model and sources used to collect data on these variables. This section also deals with the issue of choice of labour market institution indicator to be used further in the analysis. Section 5.5 gives the descriptive statistics. Section 5.6 discusses and analyses the econometric results obtained; and Section 5.7 presents the summary and conclusion.

5.2 Literature Review of Trade Liberalization and Unemployment in India

The analysis of impact of trade on poverty in India through the effect of trade on employment has been covered by few studies, namely Hasan et.al. (2012), Cain, Hasan & Mitra (2010a), Hasan, Mitra & Ural (2007), Hasan, Mitra & Ramaswamy (2003) and Topalova (2005, 2010). In most of these studies, the impact of trade on poverty is analysed and labour market effects are captured indirectly. They base their analysis on the Stolper Samuelson theorem and hence the prediction is that trade liberalization would lead to a fall in unemployment in a developing country exploiting its abundant factor, labour. As a result, trade reforms in unskilled labour abundant countries should lead to poverty reduction. However, if mobility of labour from one sector to another is restricted, this would adversely affect the poverty reducing effect of trade. The above mentioned studies, except Hasan et.al. (2012), do not explicitly include unemployment in their empirical analysis.

In Hasan et.al. (2012), unemployment rate for both urban and rural areas had been taken as the dependent variable to analyse impact of trade openness on unemployment for 15 major states and how the effect varies with labour flexibility indicators of states. The data relates to four rounds of NSSO for the years 1987-88, 1993-94, 1999-2000 and 2004-05. The following relationship was empirically tested using panel data methodology:

$$\ln y_{it}^{j} = \alpha + \beta_1 \text{protection}_{it-1}^{j} + \beta_2 \text{protection}_{it-1}^{j} * \text{regulation}_i + \delta_i + \mu_t + \varepsilon_{it}$$

where y_{it}^{j} is the log unemployment rate in state i and sector j (j comprises of state and its rural and urban areas); $\text{protection}_{it-1}^{j}$ refers to state-level trade protection measure lagged by one year, for state i and sector j[21]; and regulation_i captures the level of regulations across states[22]. δ_i refers to fixed state effect, μ_t refers to year effect, and ε_{it} refers to an error term assumed to be identically and independently distributed. The study found that overall state unemployment on average had no significant relationship with average protection over time and across states. However, the study argued that there was evidence of effects of trade protection on overall and urban unemployment in states with relatively flexible labour markets. Hence, trade liberalization there can reduce unemployment.

Hasan, Mitra & Ural (2007) and Cain, Hasan & Mitra (2010a) analysed the impact of trade on poverty by estimating the same equation as above, except that dependent variable was state-level and region-level poverty rate of India. The results were more or less similar in both studies that trade liberalization had poverty reducing effects in the states and these positive effects were stronger in states with more flexible labour market institutions, better transportation connectivity and developed financial systems.

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[21] Trade protection measure is taken as PCA of tariffs and non-tariff barriers calculated at the state level as:

$$\text{Tariff}_{it}^{j} = \Sigma_k \gamma_{ik}^{j}{}_{1993} * \text{Ind\_Tariff}_{kt}$$

$$\text{NTB}_{it}^{j} \Sigma_k \gamma_{ik}^{j}{}_{1993} * \text{Ind\_NTB}_{kt}$$

where $\gamma_{ik}^{j}{}_{1993}$ is the share of employment industry k in sector j of state i. Ind_Tariff_{kt} and Ind_NTB_{kt} are industry tariff rates and non-tariff coverage rates for year t.

22 The study uses three approaches to categorize states according to flexibility of labour markets. The first approach follows Besley and Burgess (2004) of coding IDA amendments as pro-employee, anti-employee, or neutral for the period of 1958 and 1992. This has been then extended to the year 2004. Secondly, the above approach is modified on the basis World Bank research project which studies the investment climate faced by manufacturing firms for ten states of India. Thus, the classification is modified such that Maharashtra and Gujarat are now categorized as flexible while Kerala is categorized as inflexible in terms of their labor markets. This classification of states is what has been recently incorporated in Gupta, Hasan, and Kumar (2009).

The two studies by Topalova (2005 & 2010), adopted similar model and methodology for district level and state level poverty data for India, but presented contrasting results. The papers concluded that the poverty reduced in both rural and urban parts of India. But in rural parts, poverty reduction was lesser where employment was concentrated in sectors experiencing larger reductions in tariff protection. In addition, states with flexible labour laws, experienced higher growth rate and in performed better in the phase of liberalization. The explanation of the results have been sought in the lack of the perfect factor mobility in response to liberalization; labour was unable to reallocate away from sectors experiencing reductions in tariffs. Thus, the standard theoretical models of trade fail to explain the relationship between trade liberalization and poverty in rural parts of India.

Hasan, Mitra & Ramaswamy (2003) used industry-level data of manufacturing sector for 15 states of India to examine the impact of trade reforms on labour-demand elasticitie. They tested for whether the elasticities increased with trade liberalization for the period of 1992-97 in comparison to the previous period of 1980-91. They also examined the relationships between labour-demand elasticities, trade liberalization, and labour-market rigidity. They found that first, labour-demand elasticities rose after the trade liberalization process. Second, an industry with higher protection had lower labour-demand elasticity. And third, elastic labour demand and higher impact of trade liberalization on the elasticity of labour demand was observed for the states with flexible labour markets. Goldar (2009) analysis on labour demand or the employment due to trade liberalization in the Indian manufacturing sector present contrasting view. In this study, econometric results showed that labour demand elasticity was lower in post reform period (1991 – 2004) than in pre-reform period (1980 – 1991).

Thus, empirical evidence on trade and poverty relationship whether by taking labour market aspects directly or indirectly into consideration, does not provide unqualified support for trade liberalization. There does not emerge also a clear cut conclusion about the impact of trade liberalization on unemployment, leaving scope for further research in this area.

5. 3 Model Specification

The following empirical exercise analysing the impact of trade on unemployment, though adopt similar model and methodology (as discussed in the

above section), modifies it to match requirements of the hypothesis of present study. The empirical model, given below, is estimated by using the panel data methodology.

$$U_{it}^{j} = \alpha + \beta_1 \text{Trade}_{it-1} + \beta_2 \text{Trade}_{it-1} * \text{institution}_{i} + \beta_i Z_{it} + \mu_i + \nu_{it} \quad (1)$$

where U_{it}^{j} = log of unemployment rate of state i and sector j (rural, urban or overall state); Trade_{it-1} = measure of state-level trade openness indicator for state i lagged by one year; institution_i = time-invariant variable capturing the labour market institution for the i^{th} state; Z_{it} = vector of control variables; μ_i denotes the unobservable individual state specific effect and ν_{it} denotes the identically and independently distributed error term.

The dependent variable is standardized aggregate unemployment rate for the state or its rural and urban sectors. It is the proportion of unemployed population to the size of labour force.

The explanatory variable, Trade is measure of trade openness of the state, calculated as total trade (exports + imports) by NSDP ratio. The variable is lagged by one year to account for time required for unemployment to adjust to changes in trade values. The expected sign of its coefficient is negative.

The variable 'institution' above, represents measure of labour market institution of states of India. The nature of labour market institutions may influence how trade openness affects unemployment. Davis (1998) was one of the earliest studies that analysed how unemployment increased with opening of international trade in European countries due to minimum wage law in Europe. Other studies like Boulhol (2008), Moore & Ranjan (2005) and Kim (2011) showed that this result holds for a broader set of labour market institutions. They argued that if labour markets are rigid, trade openness may lead to higher increase in unemployment.

The total effect of a marginal increase in trade on unemployment rate hence, can be calculated as $\beta_1 + \beta_2$*institution from equation (1) above. The coefficient (β_1) estimates direct effect of trade openness on unemployment. A positive (negative) sign of estimate of β_1 (without taking the second term into account) would imply that increase (decrease) in trade openness leads to increase (decrease) in unemployment rate. However, nature of labour market institution would also influence how openness affects unemployment and is captured by estimate of β_2. A positive β_2 would imply that an increase in international trade leads to higher unemployment in rigid labour market state, whereas it will reduce unemployment in flexible labour market state. The

combinations of a positive β_1 and a negative β_2 or vice versa would imply that rigidities in labour markets may reduce the effect of trade openness on unemployment of states (Kim, 2011).

The three control variables denoted by Z in equation (1) are, per capita NSDP; per capita development expenditures of the states and share of population between 15 and 69 age group in total population of the states. These variables are found to be significant in affecting employment levels of a country in various studies such as Kim (2011), Hasan (2001); and hence are incorporated here. The signs of coefficients of all other variables except population aged 15 to 69 as a share of total population are expected to be negative.

While specification of equation (1) is similar to that estimated by Hasan et.al. (2012), there are some important distinguishing points relating to data coverage, definition of variables and methodology. Firstly, the present analysis takes into account data for last two thick rounds of NSSO survey of 2009-10 and 2011-12, which have not been incorporated in any study on the subject. The inclusion of these two additional rounds of data is expected to provide more efficient estimates of relationships and would also allow comparison with results of earlier studies.

Secondly, the existing studies focussed only on 15 or 16 major states of India whereas 21 major states of India are taken into consideration here. Extension of data set to cover two latest rounds of NSSO survey and more number of states in empirical exercise, increases number of observations considerably and improves precision of the coefficient estimates.

Thirdly, existing literature defines trade openness variable as a policy variable and hence incorporate tariffs and non-tariff barriers of the industries and converts them into state protection measures by taking employment shares of respective industries as weights.[23] This study takes measure of trade openness as percentage of states' total trade (both exports and imports) in NSDP. This is value / outcome measure of trade openness, and not a policy measure. These two measures and pros and cons of using them in an empirical exercise are discussed in detail in chapter 3.

The fourth difference is adoption of state level reform index developed by OECD (2007), which is elaborated in next section. The existing studies incorporated labour market flexibility index developed by Besley & Burgess (2004). This had been

[23] Details given in footnote no. 21.

criticized extensively by Bhattacharjea (2006), not only on methodological grounds but also on its coverage. The index incorporates amendments to the Industrial Disputes Act (IDA) but ignores many other existing labour laws and hence is narrow in scope. The OECD index on other hand has a broad coverage and is based on survey of 50 specific subjects sent to employees, trade unions and officials in 21 states, covering eight major labour legal areas.

5.4 Variables and Data Sources

5.4.1 Definition of variables and sources of data

The definitions of variables used in the model and their data sources are detailed below.

Unemployment rate: The unemployment rates for the state and rural and urban sectors are calculated from the data of Employment-Unemployment surveys of NSSO. Since the period of study is post 1991, data from five quinquennial survey rounds for years 1993- 94, 1999- 2000, 2004-05, 2009-10 and 2011-12 are utilized. The surveys collect information of all household members for three periods of reference namely, one year, one week and each day of reference week. Their participation in economic activities is determined on the basis of these reference periods and are known as usual status for one year as reference period; current weekly status (CWS) for one week prior to the survey and current daily status (CDS) for each day of seven days prior to the survey as reference period. The study incorporates CWS to calculate unemployment rate as a ratio of number of unemployed to size of labour force for 21 major states of India. One point to note is that the tables given in reports of NSSO are generally presented as rates 'per 1000' with figures being rounded off. Those figures are, therefore, slightly different from our calculated unemployment rate. The estimates presented, mostly, refer to mid-point of each survey period for e.g. for survey round of July 2009 – June 2010 of NSSO 66th round, figures would pertain to January 1, 2010.

As noted in Chapter 4, boundaries of new states after the year 2000 have been considered to maintain consistency in data across period covered under the study. The unemployment rates for three new states – Jharkhand, Chhattisgarh and Uttaranchal - are therefore calculated separately from unit records for three rounds, for the period before 2000. For period prior to the year 2000, Bihar, Madhya Pradesh and Uttar Pradesh refer to present geographical regions represented by these states.

Trade Openness Variable: The state's total trade (i.e. exports plus imports) as a percentage of NSDP is taken as a measure of trade openness for states in India (as is done in empirical exercise of the previous chapter). The various approaches of measurement and the methodology followed to calculate exports and imports of states are elucidated in detail in chapter 3.

Labour Market Institutions: This refers to OECD index of labour reforms of states in India given in OECD (2007). This index is based on the survey covering eight major labour legal areas and 50 specific topics of reforms for 21 states of India (covering 98% of population and GDP). This is one of the broad measures of labour market institutions at state level for the Indian economy. There are various other measures available in literature, which have been used to study the impact on economic performance of India. The review of all these measures and controversies surrounding them is beyond the scope. But a brief description of all available state level measures and limitations of other measures that led to choice of OECD labour reforms index, is provided in the next subsection (5.4.2).

Control Variables: There are three control variables included in equation (1) - real NSDP per capita, per capita development expenditures of states and population in the age group of 15 to 69 as a share of total population of states. The data for per capita NSDP at current prices is taken from CSO and are converted to constant 2004-05 prices. The data on development expenditures of states are obtained from the RBI website. The population data used to convert them on per capita basis are taken from the Ministry of Statistics and Programme Implementation (MOSPI). The data for proportion of population aged between 15 and 69 for each state is calculated using data of Employment Unemployment surveys of NSSO.

Dummy Variable: To capture high growth phase of India experienced after the year 2000, dummy variable is included in the equation above (takes on value 1 for years after 2000 and 0 for all prior years).

5.4.2 Indices of Labour Market Institutions for India

There are various indices available to capture the nature of labour market institutions of India. These indices try to capture whether labour regulations are leading to rigidities in the operation of labour markets in India. There are at least 45 central laws dealing with labour in India and states can make their own amendments in these laws and can also pass their own laws on subjects under the Concurrent List. There are

hence around 200 additional state laws on labour in the country (Anant et.al., 2006). The present indices are based on assigning quantitative values (generally binary) to qualitative indicators in order to code entire laws or legal frameworks into numerical values. This has a very big advantage in allowing labour market institutions to be evaluated in relation to other economic variables like GDP growth, employment etc. However, it suffers from an important limitation of subjectivity in assigning a quantitative value to a qualitative indicator which can lead to an ambiguous or misleading measuring of the indicator. The usage of these quantitative values for policy recommendations can lead to problems of wrong recommendations or undesired outcomes (Beneditinni & Niccita 2010).

The indices are either calculated for the country as a whole which are useful for cross country comparison of flexibility of labour markets or are calculated at state level for intra country comparison across states. Since the study restricts its analysis to state level measures, labour market flexibility indices for states are discussed below (and not country level indices). Four relevant indicators for labour markets of states in India are presented below:

(i) One of the most widely used and discussed index was given by Besley & Burgess (2004), commonly written as BB index. As noted above, there is plethora of central and state laws dealing with labour issues in India in broad areas of industrial relations; welfare and safety; social security; wages; and specific sectors and categories. This index considered amendments to IDA, which is one of the important acts under industrial relations laws, made by each state in the period of 1958 to 1992. These amendments were then classified into categories of pro-employee, anti-employee, or neutral and accordingly assigned a code of +1, -1 or 0. If in state, more than one amendment is passed in a year, these multiple amendments were coded to give the net direction of change. Thus in any state and any year, values of codes are limited to 1, 0, −1. These codes were then added over time to arrive at the index value for each state.

This index had been criticized extensively by Bhattacharjea (2006) on grounds of interpretation of the amendment to be categorized as pro / anti employer or neutral and on methodology followed to create the index. One, the index focusses only on IDA and completely ignores presence of many other labour laws and hence, is very narrow in scope. This has been criticized by many observers like Nagaraj (2004) and TeamLease (2006); and argued that there are other regulations more important than IDA governing labour issues in India. Second criticism is on the methodology of

cumulating multiple amendments made by a state in a year in a single score reflecting net direction of change. This procedure has led to reducing the number of total amendments from 113 to only 19 changes for the period. Hence, value of the index changes infrequently and in equal magnitude of either +1 or –1. Thirdly, the index does not taken into account relative importance of amendments or the extent to which they were implemented by the states; it ranks them at the same level.

(ii) Investment Climate Assessment (ICA) Index has been created by the World Bank (Iarossi, 2009) for 16 major states in India. But it is not exclusively a labour market index as it takes into account three categories in the survey; inputs, infrastructure and institution. Within each category two dimensions of objective values (cost) and subjective indicators (perception) were considered. In further analysis of index, it was found that most of the variation in investment climate of states is explained by infrastructure and institution variables (which explain 60% of variation of all 46 variables), where the largest difference amongst states was observed. These two are important variables driving the better environment for business in India.

(iii) Another index called as 'labour ecosystem index' is constructed by TeamLease Services (2006) in their India Labour Report. The states were ranked by labour ecosystem encompassing labour demand, labour supply and labour laws. For the ranking, 27 state level variables were employed, covering infrastructure, governance, availability of human capital, and industrial disputes and dispute settlement measures. The states with the highest rank in overall labour ecosystem were Delhi, Gujarat and Karnataka whereas Maharashtra, Karnataka and Punjab were top three states in the ranking of labour laws in India.

(iv) The index used for empirical analysis in this study is state level labour reforms index given in OECD (2007). The index encompasses survey of 21 states with the questionnaires sent to employers, trade unions and officials in each state, covering 50 specific subjects of reforms under eight major labour legal areas. These areas are: the Industrial Disputes Act, Factories Act, State Shops and Commercial Establishments Acts, Contract Labour Act, the role of inspectors, the maintenance of registers, the filing of returns and union representation. The maximum scores were assigned to IDA and Contract Labour Act. The survey responses were then scored on basis of reduction in transaction cost accrued due to procedural changes with value '1' if cost is reduced and value "0" otherwise, constrained to maximum score of 50. Two questions were scored as "2" for further reduction in the transaction cost. These scores on each individual

items (across eight labour legal areas) were aggregated and compiled into an index. The index thus reflects the extent of reduction in the labour related transactions costs due to the procedural changes across Indian states.

The degree of reforms carried out by states had been quite modest as no state scored more than 28 out of maximum score of 50 in all reform areas. The sections of IDA concerning collective layoffs; working hours' regulation; recognition of unions and reduction in the number of inspections observed some significant changes. Also, the index values show large variation across states in the extent of reforms carried out in all areas. The two lowest ranked states were Chhattisgarh and West Bengal (with a score of 14 each), followed by Goa and Bihar (with a score of 16 each). The three highest ranked states are Uttar Pradesh (at score of 28), Gujarat and Andhra Pradesh (at score of 27 each). The reforms conducted across states were broad ranged and there were no dominant areas where the highest-ranked states showed major improvement. But an important observation is that variation was lowest for two reform areas of IDA and Contract Labour Act as all states carried out at least some reforms in these two.

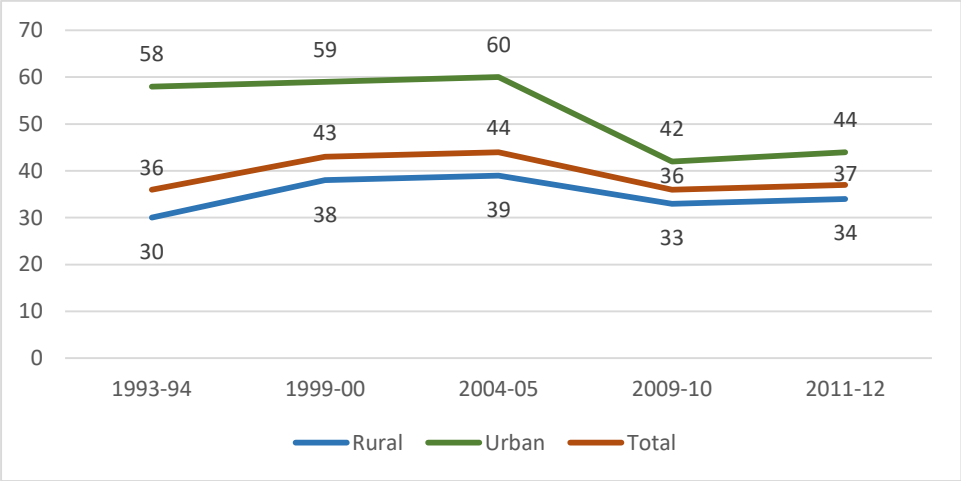
The OECD index is adopted in the present study, as it is a broad based indicator with respect to its coverage of labour market institutions across states. It focusses only on eight important labour legal areas and does not cover other aspects of states as is done by indices like ICA or 'labour ecosystem index'. ICA looks at the overall investment climate of states and hence includes indicators like infrastructure and governance, apart from institution. 'Labour ecosystem index' is also a broad indicator looking at labour demand, supply and institutions of states of India. BB index though is most widely used in the empirical studies on India, is restrictive and narrow as it only concentrates on IDA and ignores other central and state level labour laws. Most of the studies employing this indicator such as Cain, Hasan & Mitra (2010a), Hasan et.al. (2012) and Ahsan & Pages (2009), have also modified it to overcome its shortcomings but limitations in the methodology still remain.

5.5 Descriptive Statistics of Unemployment

The unemployment rate of India and also for rural and urban sectors are shown in Figure 5.1 below. The unemployment rate experienced an increasing trend from 1993-94 to 2004-05; decreased sharply from 2004-05 to 2009-11 and increasing slightly in the last period of 2011-12. The unemployment rate of urban sector is consistently greater than unemployment rate of rural sector for the period under

consideration from 1993-94 to 2011-12, although the gap is decreasing overtime. The rural unemployment rate was increasing at a higher rate in the earlier period but declined marginally later. However, opposite is true for the urban unemployment rate which increased marginally between 1993-94 and 2004-05 but declined sharply in 2009-10.

Figure 5.1: Unemployment Rate in India: Rural, Urban and Total



Source: Author's calculation using data of various NSSO survey rounds.

Table 5.1 shows the unemployment rate for five time points between 1993-94 and 2011-12 for rural and urban sectors of all states under study. The states show a similar trend as the overall trend of unemployment rate. Almost all the states experience an increase in unemployment rate till 2004-05, a sharp fall in 2009-10 and a small increase in 2011-12. Exceptionally high unemployment rate (both rural and urban has been observed in two states of Goa and Kerala. The other states as West Bengal, Orissa and Assam experience high rural unemployment rate. West Bengal, Assam and Jharkhand also show a high urban unemployment rate. The gap between minimum and maximum unemployment rate observed across states has been declining over the years, more so for urban than rural sectors of the states. There are large variations in both rural and urban unemployment rates across states as is shown by the standard deviation calculated for each year and given in table below.

Table 5.1: Unemployment Rate for States in India

	Rural					Urban				
States	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
Andhra Pradesh	27	39	38	36	30	51	51	52	42	55
Assam	65	53	41	46	49	91	104	81	48	57
Bihar	25	26	31	30	39	62	78	82	79	67
Chhattisgarh	12	37	53	24	39	69	77	55	36	78
Delhi	n.a.	44	19	17	84	20	34	55	29	40
Goa	139	122	169	47	52	112	238	128	41	46
Gujarat	23	19	15	32	8	43	28	37	23	9
Haryana	39	27	43	40	38	48	38	55	35	43
Himachal Pradesh	8	18	40	33	19	29	73	45	62	34
Jharkhand	44	52	45	44	28	107	91	77	74	60
Karnataka	16	18	19	17	16	47	40	36	34	34
Kerala	89	125	156	95	107	129	138	180	91	85
Madhya Pradesh	21	21	27	25	15	60	51	44	37	36
Maharashtra	26	35	44	26	22	56	68	64	47	30
Orissa	44	38	74	54	51	81	80	138	47	47
Punjab	18	24	48	37	35	36	39	62	59	35
Rajasthan	7	22	31	19	24	21	38	41	31	47
Tamil Nadu	39	44	30	29	45	62	52	49	36	41
Uttar Pradesh	27	22	19	31	29	43	53	49	35	50
Uttaranchal	13	38	29	31	28	58	34	63	36	57
West Bengal	46	107	57	32	50	97	87	75	52	56
Min	7	18	15	17	8	20	28	36	23	9
Max	139	125	169	95	107	129	238	180	91	85
Average	36	44	49	36	38	63	71	70	46	48
Std. Dev	31	32	39	16	23	29	46	36	17	17

Source: Author's calculation using data of various NSSO survey rounds.

There are various factors that can be attributed to this trend observed in unemployment rate in India. Firstly, the labour force rose by 61 million in the period of 1999-2000 and 2004-05, whereas it rose by only 2 million during 2004-05 and 2009-10 and by 14 million between 2009-10 and 2011-12 (Mehrotra et.al., 2014). According to Thomas (2012), a large part of this variation can be explained by an absolute fall in employment in the agricultural sector and an increase employment in the non-agricultural sector. The period of 1999-00 and 2004-05, experienced a massive increase

in self-employed women in the agricultural labour force, who entered the labour force due to distress conditions in the agricultural sector. Between 2004-05 and 2009-10, large number of rural females exited the labour force and 85% of them were in the self-employed category. An important reason for this shift was the revival of the rural economy and the introduction of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) that increased employment and wages of the rural sector, thus improving the earning opportunities for male members of the family.

Another reason for slow growth of work force post 2004-05 is the increase in school enrolment of the students reducing the incidence of child labour. Thirdly, according to Mehrotra et.al. (2014), India is observing structural change in the employment, with a decline in agricultural employment and a rise in non-agricultural employment. For the first time, the absolute number of people engaged in agriculture fell, in 2011-12 (36 million lesser than in 2004-05). Correspondingly, manufacturing and services sector experienced a push in the employment. However, the growth at which employment is increasing in the non-agricultural sector still remains as issue, as to whether it would be able to absorb the people entering the labour force as well as the shift of labour towards non-agricultural sector. The organised manufacturing employment is growing consistently, though slowly, since 1999-00. The organised sector is largely experiencing an increase in the employment of informal workers. At the same time unorganised services and non-manufacturing industry (largely construction industry) is showing a consistent growth in employment. This is a cause of concern, as with respect to the consumption expenditure, these households predominantly lie in the bottom deciles.

5.6 Analysis of the Regression Results

5.6.1 Regression Results

The impact of trade openness of states on unemployment rate is analysed by estimating three separate panel regressions for equation (1) above. The estimation results are presented in Table 5.2 below for total state and its rural and urban sectors.[24] A detailed presentation of panel regression model and the fixed effects / random effects

[24] The results of FE and RE specifications of the three regressions are given in Appendix 5.1. The choice between the two specifications is based on Hausman test and Mundlak formulation, which is also presented in the tables in Appendix 5.1. To choose the final specification of the model, Mundlak formulation is given preference over Hausman test wherever contradictory results emerge as it is based on robust standard errors, as opposed to non-robust standard errors in Hausman test statistic.

specifications are given in chapter 4, section 4.5. The section also provide details of two approaches - Hausman Specification Test and Mundlak Formulation - adopted to make choice between the two specifications.

There are a few important points regarding the empirical exercise followed: Firstly, The above equation was initially estimated without incorporating labour market institution variable to study impact of trade openness on unemployment. To analyse the impact of labour market rigidities on this effect, the equation was estimated again by taking interaction term of trade and labour market institutions. In that case, higher trade openness is expected to decrease unemployment in states with relatively flexible labour markets. The explanatory power of the model (R^2) improved significantly with introduction of interaction term. Hence, results of the regressions with interaction term are reported in tables below. Secondly, one of the control variables i.e. per capita development expenditure was excluded as it was found to be highly correlated with per capita net state domestic product. Thirdly, time dummies with base year of 1993 were also introduced in the model but the goodness of fit improved by introducing the dummy variable to capture high growth period of India, after the year 2000 (dtime). Hence, time dummies were excluded and dummy for high growth period was included in final specification of the model. The results of this final specification are presented in the table below.

An important point to consider is that the empirical results would not give the level effects of trade openness on unemployment rate of states in India but it would study the relative impact on states that are more or less open to trade. Thus, the empirical analysis captures unequal effects of trade openness on unemployment of states. Also, the results would help to analyse impact on total employment of states (and its rural and urban sectors) and not only on manufacturing employment which has been main focus of studies in this area. Since, manufacturing employment represent a small proportion of the population, it is better to take into account employment in all sectors of the economy. Hence, the results capture general equilibrium effects of trade openness within states.

Table 5.2: Panel Data Estimates of the Unemployment Equation for the States

Dependent Variable : Log of unemployment rate			
Variables	**Total**	**Rural**	**Urban**
L. Tradelag	-1.5255 (-1.89)*	-1.7791 (-2.09)**	-1.4321 (-1.60)
L. Tradelag*labour institution	0.0632 (1.79)*	0.0647 (1.85)*	0.0454 (1.23)
L. Per Capita NSDP	-0.1475 (-0.54)	0.3041 (0.46)	-0.1184 (-0.39)
L. Working Population Proportion	-1.8279 (-2.98)***	-2.5136 (-3.15)***	-0.7787 (-1.44)
Dtime (2004 - 2011)	0.2113 (2.31)**	0.2072 (2.06)*	0.1427 (1.44)
L. Tradelag-M			1.6074558 (1.40)
L. Tradelag*labour institution-M			-0.06282097 (-1.66)*
L. Per Capita NSDP-M			-0.11643448 (-0.26)
L. Working Population Proportion-M			2.5333278 (1.49)
Constant	13.2134 (3.45)***	12.0400 (2.07)*	-0.3291 (-0.06)
R square within R square between R square overall	0.22 0.37 0.21	0.18 0.27 0.10	0.27 0.52 0.42
Test Statistic for Joint Significance of Slope Coefficients	F(5,20) = 4.10 Prob > F = 0.01	F(5,20) = 3.06 Prob > F = 0.03	Wald chi2(9) = 39.64 Prob > chi2 = 0.00
Selected Model	FE	FE	RE
Observations No. of States	105 21	105 21	105 21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with robust standard errors are reported for FE and RE models, respectively.
The reported R square is within R square for FE models and overall R square for RE models.
The variables specified with 'M' are additional variables created for Mundlak formulation, calculated as Xi = $\overline{Xt}$.

The results presented for the states and their rural and urban sectors respectively, indicate that trade openness negatively and significantly impact unemployment rate of states with a lag of one year. The increase in trade openness lead to significant reduction in total unemployment rates of states, with the coefficient of -1.52. This is true for rural areas of the state where value of coefficient of trade openness is quite high and significant at -1.8 and is driving the negative relationship found for total state. There is no statistical significant relation found between trade openness and unemployment for

urban parts of states. The coefficient is negative but insignificant with value of -1.4. Since the estimating equation is of log linear form, these coefficients are estimates of the elasticities.

The presence of interaction term between trade openness and flexibility of labour market institutions shows that this effect is higher for more flexible states than for rigid states and this effect is also significant for both total and rural parts of the states. The coefficient for interaction term is 0.06 for total states and rural part of states and 0.04 for urban component of states and is significant for total and rural at 10% level of significance but not for urban areas of states.

Per capita NSDP is not found to be significantly impacting unemployment rate in all three regressions and value of coefficient is -0.15 for total, 0.30 for rural and -0.12 for urban areas. The second control variable, proportion of working population in a state is negatively and significantly affecting unemployment rate, again for the total and rural component of states (at 1% level of significance) and not for the urban component. The value of coefficient is respectively -1.8, -2.5 and -0.78. This variable is most strongly affecting unemployment rate for the total state and its rural sub component.

Surprisingly, coefficient of dummy variable for high growth phase is positive and significant at value of 2.0 for total state and its rural sub part, indicating that high growth rate of the economy has led to rising unemployment. However, this factor is not found to be significant for urban subcomponent of states. The results thus indicate that both levels of per capita income and high rate of growth do not result in lowering unemployment rates in urban sectors of the states of India.

Thus, the results are quite similar for state as a whole and for rural sectors of states. All explanatory variables: trade openness, its interaction with flexibility of labour market institutions, proportion of working population and dummy variable are found to be significant in the regression results. Only per capita NSDP is not found to be significantly affecting the unemployment rate.

On the other hand, results for urban sectors of the Indian states reveal a different picture. One, chosen model for urban sector is RE, whereas in other two regressions results, chosen model is FE. Second, none of the coefficients are found to be significantly affecting unemployment rate in urban sectors. This implies that the results of states are driven by its rural sectors, which are dominant in explaining unemployment situation of the country.

5.6.2 Discussion of Results

The results presented above are in agreement with results found in other studies. Dutt et.al. (2009) analysed the effect of trade liberalization policies on the unemployment rate for 92 countries and found strong evidence of trade openness leading to reduction in unemployment rate. Their results show that a one percent increase in average tariff rate leads to more than 0.3 percent increase in unemployment rate. Felbermayr (2011b), employed data for 20 rich OECD countries, found that higher trade openness decreased unemployment. This result was robust to different econometric models, different specifications and choice of sample. The beneficial impact of trade openness on unemployment rate of developing countries had also been analysed in other studies such as Milner & Wright (1998) for Mauritius; Harrison & Revenga (1995) for Costa Rica, Peru and Uruguay; Hasan (2001) for panel of 48 developing countries; Said & Elshennawy (2010) for Egypt and Hasan et.al. (2012) for India.

Kim (2011) also empirically analysed this relationship for 20 OECD countries and found that an increase in trade increases the unemployment when there are rigidities in labour markets and lower aggregate unemployment when the labour market was flexible in a country. It was also found that GDP per capita was negatively influencing unemployment implying the business cycle effect i.e. richer countries tend to have lower unemployment. Meanwhile, for these OECD countries the share of working age population was not found to be significantly impacting the unemployment rate. In results of the present study, the coefficient for per capita NSDP though positive is not found to be significantly affecting unemployment rate. But proportion of working population is found to be reducing unemployment rate.

The coefficient for dummy variable (representing high growth phase) is positively and significantly affecting unemployment rate. This confirms to 'jobless' growth shown by the Indian economy in last two decades as has been discussed in many studies such as Bhattacherjee (1999). The study concluded that declining employment elasticities with respect to output i.e. more output is produced with lesser employment, is due to higher investment in more capital-intensive industries and technology. Also it has been found that since the mid-1980s, private and public sector enterprises are reducing labour employment, attributing to the observed declining elasticity.

However, Hasan et.al. (2003) looking at Indian manufacturing sector found a positive effect of trade liberalisation on own price elasticity of labour demand. This

imply that productivity and output shocks (arising due to trade liberalization) would lead to larger shocks in employment and wages. Also, the results indicated that these elasticities were larger in size and were impacted to a large extent by trade reforms for states with relatively more flexible labour markets in India. Goldar (2009) also corroborated above results that trade liberalisation led to increased labour demand elasticity. They found evidence of labour demand elasticity been declining for the period of 1985-95 compared to the period of 1973-84 but increasing significantly after mid-1990s. This rise in labour demand elasticity from mid-1990s was largely attributable to trade liberalisation which demonstrated its real impact with a lag in India. They also found a positive association between labour market flexibility and increase in labour demand elasticity.

There is no study analysing impact of trade openness on unemployment rate of India, when trade openness is measured in actual trade values. The study by Hasan et.al. (2012) is closest to the present analysis where this relationship was analysed by taking trade policy measures for states of India. They found no evidence of effect of state level protection measures of tariffs, non-tariff barriers and principal component of the two, on unemployment rate of states. The coefficient though was positive but insignificant. They also introduced interaction term of trade protection and labour market flexibility indicators and found this variable to be positively affecting unemployment rate. The coefficient of protection measures still remained positive and insignificant. Thus, they found that a one percentage decrease in tariff rate led to 1.1 percent decrease in unemployment rate, in states with flexible labour markets.

These results were similar for overall unemployment rate as well as rural and urban unemployment rates of states but this positive relationship was found to be stronger in urban sectors. This is opposite to results of the present study as there is an evidence of stronger negative relation between trade openness and unemployment rate in rural areas than in urban areas. This is surprising as the existing studies primarily focus on the manufacturing sector and urban areas as there are considered to be predominantly affected by trade liberalization (Goldberg & Pavcnik, 2004).

According to trade theory, the Ricardian model predicts that trade liberalization (or tariff reduction) lead to fall in unemployment and the Heckscher-Ohlin structure predicts that this will happen in a labour-abundant country. According to results of the present empirical exercise, states with higher trade flows experience greater reduction in unemployment rates and this effect is found to be stronger in presence of flexible

labour markets. Also, these effects are more pronounced for rural parts of the states. The results hence confirm to the theory that in developing countries trade leads to increase in employment of labour; more so unskilled and a movement away from agriculture and hence rural sector of the economy.

The stronger negative effect (or weaker positive effect) on rural sector had been explained by considering lack of mobility of the Indian population. According to those studies, migration across states in India had been declining in recent decades and largely population was moving across districts within same states and most of migration was amongst women post their marriage. However, these studies have been concentrating on the period 1987-88 to 2003-04, whereas the present study takes into account the period of 1993-94 to 2011-12. This difference in time periods under consideration can be the main reason of difference in analysis.

The studies on internal migration showed that mobility of population had declined in India up to 1990's and increased later during post reform period (Kundu & Gupta, 1996 and Bhagat, 2010). According to table 5.3 below, population mobility for overall population declined marginally between 1987-88 & 1993. After that, internal migration had steadily increased from 24.8 percent in 1993 to 28.5 percent in 2007-08. Out of total internal migrants, 70.7% are women migrants. The main factor for female migration (for both rural and urban) is marriage with 91% and 61% respectively. The main factor for male migration is employment-related with respective percentages of 29% and 56% (NSSO, 2007–2008).

The data also substantiated this shift from rural agricultural to rural non-agricultural and urban sectors of the economy. According to the table 5.4 for two NSSO rounds of 1999-00 and 2007-08, rural to rural flow constituted around half of total migration. Rural to urban migration (which increased from 20.9% in 1999-00 to 23.3% in 2007-08) constituted around 25 percent of total, followed by urban-urban and urban to rural. One important point emerged, that for females (prominent reason for migration was marriage) the dominant flow was from rural to rural whereas for males (where prominent reason for migration was employment) the dominant flow was from rural to urban.

Table 5.3: Migration Rates from Different NSSO rounds

Round (year)	Male	Female	Person
64th (2007-08)	10.9	47.2	28.5
55th (1999-00)	11.7	42.4	26.6
49th (1993)	10.8	39.6	24.8
43rd (1987-88)	11.9	39.8	25.4
38th (1983)	12	35.4	23.4

Source: NSSO (2010), Migration in India 2007-2008.

Table 5.4: Stream-wise Distribution of Migration by Sex (%)

Migration Streams	Male	Female	Total
55th round (1999-2000)			
Rural-to-rural	32.1	60.5	51
Rural-to-urban	29.8	16.5	20.9
Urban-to-rural	13.1	8.3	9.9
Urban-to-urban	25.1	14.7	18.2
64th round (2007-08)			
Rural-to-rural	27.5	59.6	48.9
Rural-to-urban	33.9	18	23.3
Urban-to-rural	12.1	6.8	8.6
Urban-to-urban	26.5	15.6	19.2

Source: NSSO (2010), Migration in India 2007-2008.

The studies have shown that this rural to urban migration was largely motivated by availability of employment in urban informal sector. Thus, there had been a strong relationship between rural-urban migration and the growth of urban informal sector. The development analysts also stressed that liberalization process, which started in 1990s in the Indian economy, led to sharp acceleration in real economic growth (over 8% p.a.) and opened up job opportunities in and around cities in many globally linked sectors. (Kundu, 2012). Hence, one can say that India witnessed an upsurge of urban informal sector in the post liberalization era which led to influx of migrant population from rural areas to urban areas across states of India (Chakraborty & Kuri, 2013).

According to Mahapatro (2012), latest NSSO estimates of 2007-08 also showed that for both males and females, proportion of migrants in salaried and wage earning class had been increasing. However, it was not necessarily implied that migrants were better off economically as various types of occupations were clubbed together in this class. These estimates also revealed that large proportion of females have been employed in agriculture, followed by manufacturing, education, trade and commerce etc., both before and after migration. The employment of male migrants however, had been found to be highest in manufacturing (26%), followed by trade & commerce

(24.5%) and agriculture (12%). The before migration employment though, was higher in agriculture sector (28.4%).

5.7 Summary and Conclusion

This chapter empirically examines the impact of trade openness on unemployment rate of the state and for its rural and urban sectors. The survey of literature concludes that there is ambiguity in the impact of trade openness on aggregate unemployment. One important point emerges that it is better to undertake country case study, as country specific effects play an important role in this relationship and therefore, it is difficult to generalise for countries at large. The empirical evidence on trade and unemployment relationship also emphasize the importance of differences in labour market institutions explaining divergence of results for various countries.

The aggregate unemployment rate for the states and rural and urban sectors is taken as dependent variable in the empirical exercise. The trade openness measure is taken as sum of exports and imports of the state as a percentage of NSDP. The regression equation also incorporates a measure of labour market institution of the state and other control variables such as per capita NSDP, proportion of working population and dummy variable for high growth phase of post 2003. The panel regression is estimated using FE and RE specifications and two tests of Hausman specification test and Mundlak formulation are conducted to choose between the two. The results with robust standard errors of the final specification selected are then presented.

The results find evidence for the negative relationship unemployment and trade openness. The results indicate that trade openness negatively and significantly affect the unemployment rate of the states with a lag of one year. The relationship is significant for rural parts of the states which also drive results for the total state; though for urban part of the states, relationship is not found to be significant. The results also indicate that this effect is higher and stronger for more flexible states, by taking interaction term between trade openness and labour market institutions in the empirical exercise.

Amongst the control variables, per capita NSDP is not found to be significantly affecting unemployment rate whereas proportion of working population in a state is negatively and significantly affecting unemployment rate and dummy variable for high growth phase is positively and significantly affecting unemployment rate for the states and its rural sub component. These are again, not found to be significant for urban India.

This study provides support to the argument that effects of trade liberalization have been different for the states in India. The results hence, confirm to the theory that in developing countries trade openness leads to increase in the employment of labour; but more so of unskilled workers and leads to a movement away from the agriculture and hence rural sector of the economy.

This is substantiated by internal migration trends for India which showed an increase in population mobility during post reform period. The data also corroborated the shift from rural agricultural to rural non-agricultural and urban sectors of the economy. For the period of 1999-00 and 2007-08 (based on data from NSSO), rural to rural migration constituted around half and rural to urban constituted around 25% of the total. The new employment opportunities, largely casual in nature, had been created in the construction sector of rural sectors of India (Thomas, 2012).

Overall, the above results provide evidence that trade openness reduces unemployment in states and more so in states with flexible labour markets. This effect is found to be stronger for rural parts of the states than their urban counterparts. This implies that trade policies and labour policies are interrelated and hence the coherence of these two policies is important for trade reforms to significantly and positively affect the employment of a country.

Chapter 6

Trade Openness and Wage Inequality

6.1 Introduction

The previous chapter analysed empirical relationship between trade openness and poverty through channel of labour market by looking at impact of trade on unemployment in the Indian economy. This chapter takes the analysis of labour market further by looking at impact on wage inequality. It is expected that in developing countries, trade openness would reduce wage inequality by pushing up wages of unskilled workers. However, most of the empirical studies have found trade openness leading to increase in wage inequality and other broader measures of inequality (Goldberg & Pavcnik, 2004). In the liberalized world, increased wage inequality and in a broader sense income inequality is appearing as a common phenomenon across countries. This chapter thus tests the hypothesis that trade openness leads to decrease in wage inequality which would then have a positive impact on poverty reduction.

A growing number of studies such as Arbache, Dickerson & Green (2004), Feliciano (2001), Greenway, Hine & Wright (2011) have analysed the relationship between trade and wage inequality. These three studies for individual countries of Mexico, United Kingdom and Brazil respectively, have found that trade liberalization was leading to increase in wage inequality. The cross country study by Stone & Cepeda (2011) showed that larger the trade, smaller were the wage differentials. However, a large strand of literature analysing the impact of trade liberalization on inter-industry wage differentials (as a measure of wage ineqaultiy) primarily in developing countries, such as Hasan & Chen (2003), Pavcnik et.al. (2004), Dutta (2007) and Caju, Rycx & Tojerow (2011), have found ambiguous results. A detailed survey of these studies is presented in chapter 2 of the study.

The survey of literature leads to the fact that empirical studies have not reached a definitive conclusion regarding impact of trade on wage inequality (Goldberg & Pavcnik, 2007). Trade openness is expected to affect poverty and wage inequality in the same way, as lower wage earners are more likely to be "poor" compared to higher wage earners (Goldberg & Pavcnik, 2004). Thus, trade openness would lead to fall in poverty and inequality in the developing countries. The objective of this chapter hence,

is to analyse the relationship between trade openness and wage inequality for states in India.

The empirical analysis is carried out using data for 21 major states and also independently for its rural and urban areas. The data for period after trade liberalization i.e. after the year 1991 is considered for empirical analysis, as stated in earlier chapters. The gini coefficient is taken as a wage inequality measure and is calculated using the individual wage data from Employment and Unemployment surveys of NSSO for all workers engaged in wage employment. This comprise wages earned by casual and regular labour employed in all sectors. However, earnings of self-employed workers are excluded from the analysis.[25] The presence of flexible labour market institutions is important for positive effect of trade liberalization on wage inequality and hence empirical analysis incorporates status of labour market institutions of different states of India.

The chapter is structured as follows: Section 6.2 gives a brief literature review with focus on the models and methodologies followed for analysing this relationship for India. Section 6.3 presents details of econometric model of the empirical analysis in this chapter; Section 6.4 presents definitions of variables of the model and sources used to collect data on these variables. It also provides a summary of various measures of wage inequality present in literature, along with discussing the factors behind taking gini coefficient as a wage inequality measure. Section 6.5 gives the descriptive statistics; Section 6.6 provides analyses of econometric results of the empirical exercise and their robustness; Section 6.7 presents the summary and conclusions of the chapter.

6.2 Literature Review of Trade Liberalization and Wage Inequality in India

Goldberg & Pavcnik (2007) in their study on developing countries found evidence of contemporaneous increase in globalization and inequality. India had also experienced rising inequality in its post reform period. There are various ways of studying the relationship between trade liberalization and inequality where inequality can be broadly defined as income or consumption inequality or narrowly as wage inequality.

[25] The earnings of self-employed workers are not provided in the Employment-Unemployment surveys of NSSO.

Many studies focus on analysing the effect of trade liberalization on the narrow definition of wage inequality. The important channels of the effect are reduction in industry wage premium and increase in skill premium. Industry wage premium is defined as part of the wages that are not described by evident characteristics of workers like age, gender, marital status, education level etc. The skill premium is the differences in wages of the skilled and unskilled labour. The impact of trade liberalization on industry wage premia had been studied most extensively by Dutta (2004 & 2007), Kumar & Mishra (2008), Banga (2005) and Mehta & Hasan (2012), for the Indian manufacturing sector.

The studies incorporating industry wage premia (as a measure of wage inequality) generally followed two step regression procedures detailed in Kumar & Mishra (2008). The first stage regression was of the form:

$$\ln(w_{ij}) = \beta_H H_{ij} + wp_j I_{ij} + \varepsilon_{ij} \quad (1)$$

where $\ln(w_{ij})$ is log of wages of worker i employed in industry j; H_{ij} denotes evident worker's characteristics and I_{ij} denotes industry affiliation of workers (industry dummies at 3 digit NIC-1987). The coefficient of industry dummy, wp_j is then the industry wage premium and captures the variation in wages that is determined by industry the worker is employed in. This first stage regression was estimated using the NSSO survey data for the years 1983-84, 1987-88, 1993-94 and 1999-2000.

The wage equation was estimated to derive the industry wage premiums (wp_j) which were then pooled for different years and taken as dependent variable in the second stage and regressed on trade related measures as independent variables. The panel regression equation takes the following form:

$$\Delta wp_{jt} = \eta \Delta T_{jt} + \gamma \Delta D_{jt} + \pi_t + \varepsilon_{jt} \quad (2)$$

where Δwp_{jt} denotes variation in wage premium for industry j between two time periods of t-1 and t; ΔT_{jt} is tariffs changes of industry j; ΔD_{jt} denotes variation in other trade-related variables and π_t denotes year effects. The data was taken for 72 industries in the manufacturing sector and for 1980–81 to 1999–2000 time period.

Dutta (2004 & 2007) and Kumar & Mishra (2008) followed this methodology on data for the years 1980 – 2000. Dutta (2004 & 2007) used data of from three employment surveys for the years 1983, 1993- 1994 and 1999-2000. They found that high-tariff industries offered higher industry wage premium. The empirical model reflected that skill premium for graduates increased during this period, whereas unskilled workers were adversely affected by two factors. They faced both rising skill

premium in the industry and decline of their relative wages. This happened because of the decline in industry wage premiums in unskilled-intensive industries relative to skill-intensive industries. Thus, it was suggested that trade openness led to increase in the wage inequality.

Kumar & Mishra (2008), on the other hand, concluded that trade liberalization led to reduction in the wage inequality in India. They analysed manufacturing sector's wage premiums and found that industries employing higher proportion of unskilled workers experienced relatively larger reductions in tariffs. These industries also experienced a greater increase in their relative wages, benefitting the unskilled workers more relative to skilled workers and hence decreasing wage inequality.

Another study by Sadhukhan (2013) looked at the impact of trade liberalization on different measures of wage inequality for the organised and total manufacturing sector of India for the period of 1989 to 2007 (for organised manufacturing) and 1993 to 2009 (for total manufacturing). The study in its empirical exercise also controlled for other factors such as growth rate of economy, changes in technologies and institutions of labour market. The study differs in the use of three outcome-based measures of trade liberalization, namely, export-orientation, import-penetration, and share of South-South trade in total trade and not the commonly used policy based measures such as, tariff and non-tariff measures. The study hence, captures the ex-post effects of trade liberalization policies. The econometric results showed mixed impacts of trade liberalization but significant effect of controlled factors on various measures of wage inequality. One of the measures used i.e. Gini coefficient calculated for total manufacturing sector, was found to be positively and significantly affected only by the rising import penetration and not by other measures of trade liberalization.

Banga (2005) analysed the effect of liberalisation on wages and employment of the manufacturing sector. The study took FDI, trade and technological change as the components of liberalization. The wage-rate and labour demand equations were estimated for cross-industry analysis. The results showed that liberalization had different effects on employment and wages. FDI is not found to increase employment levels in an industry but found to be increasing the wage rate on the other hand. The exports led to increase in the industry's employment levels, though not much effect on the wage rate.

The studies discussed above focussed on impacts of trade liberalization on manufacturing sector's wage inequality. As these workers constitute a small fraction of

the work force in India, Topalova (2005) extended the analysis to consumption inequality by studying regional level inequality. The following equation was estimated:

$$y_{d\,t} = \alpha + \beta.\ \text{Tariff}_{d\,t} + \gamma_t + \delta_d + \varepsilon_{d\,t} \quad (3)$$

where $y_{d\,t}$ is a inequality measure for the district d, in year t, also for rural and urban sectors of each district. The inequality measures included were, standard deviation of log consumption and mean logarithmic deviation of consumption. These measures were then regressed on measure of international trade ($\text{Tariff}_{d\ t}$) for the district. The coefficient β, captured the impact of trade protection on inequality. The district fixed effects (δ_d) and year dummies (γ_t) were also included. The analysis was carried out for four thick rounds of NSSO survey for the years 1983–84, 1987–88, 1993–94, and 1999–2000 for 16 major states of India. The results showed that both measures of inequality remained unaffected by trade liberalization.

Mehta & Hasan (2012) further broadened the analysis by incorporating liberalization of services (for the first time) in addition to merchandise trade. They tried to find out the extent of increase in wage inequality (during 1993 to 2004) that is due to trade and services liberalization. They examined the impact on wage changes between skilled and unskilled workers (where skill is defined on the basis of education levels) using a three stage procedure. The first two stages were same as detailed above, i.e. estimation of industry wage and skill premia in 1993 and in 2004 and regressing them on measures of trade and services liberalization measures. In the final stage, a series of simulations were carried out to analyse the changes in wage premia and in prices of other attributes of workers, due to liberalization. The regression results confirmed that high tariffs reduced both industry wage and skill premia in India, whereas liberalization of services exerted a positive influence on skill premia. It was also found that industry wages and skill premiums led to large increase (around 30 – 60%) in wage inequality and that could not be explained by liberalization but was due to other factors. These findings thus, suggest that liberalization had a very limited role in explaining inequality increases occurring due to changes in wage premia in India.

The empirical findings reviewed above show different outcomes of trade liberalization on wage inequality depending upon the choice of measures of inequality and sectors under study. The available evidences are inconclusive and hence, the impact of trade liberalization on wage inequality is an unsettled issue.

The studies on Indian economy suffer from one important limitation of focussing on formal employees in the manufacturing sector (mostly concentrating on

urban sector) and leaving out informal agricultural sector and services sector. For the Indian economy, agricultural sector still plays a dominant role from employment stand point and it is important to incorporate it in the empirical analysis, as in Toplova (op. cit.). To correct for this limitation, the present study covers entire economy (agriculture, organised and unorganised manufacturing and services) by looking at wage inequality in rural and urban sectors of each state.

6. 3 Model Specification

The present study tests the hypothesis that trade openness leads to fall in wage inequality for the states of India using empirical model based on Topalova (op. cit.). This model captures the effects on wage inequality of workers in agricultural, manufacturing and services sectors in urban and rural areas of 21 major states of India. The data of surveys conducted by India's NSSO for five thick rounds of 1993-94, 1999-2000, 2003-04, 2009-10 and 2011-12 is used for the empirical exercise. The panel data methodology is used for estimating the following model.

$$W_{it}^{j} = \alpha + \beta_1 \text{Trade}_{it-1} + \beta_2 \text{Trade}_{it-1} * \text{institution}_i + \beta_3 Z_{it} + \mu_i + \nu_{it} \quad (4)$$

where W_{it}^{j} = wage inequality in state i and area j (rural, urban or overall state); Trade_{it1} = measure of state-level openness indicator lagged by one year for state i; institution_i = time-invariant variable capturing the labour market institution across states; Z_{it} = vector of control variables; μ_i refers to the unobservable unit specific effect and ν_{it} denotes the identically and independently distributed error term.

The dependent variable is a measure of wage inequality calculated as Gini coefficient for wage distribution of labour employed in the state and also for labour employed in rural and urban areas of each state. There are various other measures of wage inequality which are discussed in detail in section 6.3.2 also stating reasons for taking Gini coefficient as the inequality measure for the analysis.

The explanatory variable of primary focus is Trade, which is the measure of trade openness of the states defined as total trade (exports plus imports) to NSDP (Net State Domestic Product) ratio. The variable is lagged by one year to take into account the time lag in the impact of trade values on wage inequality. The expected sign of its coefficient is negative.

The variable 'institution' represents a measure of labour market institution of underlying 21 states of India. The nature of labour market institutions may influence how trade openness affects wage inequality. Higher trade openness is expected to

decrease wage inequality in states with relatively flexible labour market, in presence of the interaction term between trade openness measure and labour market institution. A study by (Bazen & Cardebat, 2010) emphasized on factors that contributed to increasing wage inequality and identified few important factors as labour market institutions, labour market conditions and barriers to factor mobility within country. Aghion et.al. (2008) using state and industry level data for the period of 1980 to 1997, also found labour institutions affecting the inequalizing impacts on industries of the reforms of 1991 in India.

The marginal impact of trade on wage inequality is given by $\partial W/\partial Trade_{t-1} = \beta_1 + \beta_2$*institution. A combination of positive (negative) β_1 and positive (negative) β_2 imply that trade openness lead to increase (fall) in inequality and more so in states characterised by flexible labour market institutions. The combinations of a positive β_1 and a negative β_2 or vice versa would imply that flexibility in labour market may reduce both positive and negative effect of trade on wage inequality (Kim, 2011).

Three control variables used in the empirical exercise are per capita net domestic product of the state (per capita NSDP); proportion of literate population for each state (where population of more than 6 years of age is taken) and number of people with educational qualification of graduation and above in population

The empirical model, based on Topalova (2005), is modified according to underlying hypothesis of this chapter. Topalova's model analyses the impact of trade policy on district level inequality of rural and urban workers in agricultural and manufacturing sectors. The data was taken from thick rounds of household survey of the NSSO for the years, 1987–88, 1993–94, and 1999–2000. The present analysis considers the period after liberalization and hence data of thick rounds of NSSO survey post 1991 are taken, extending the analysis by Topalova further to additional survey rounds of 2004-05, 2009-10 and 2011-12. The last two rounds specifically, have not been incorporated so far in any study on impact of trade on poverty or wage inequality. This addition of data is expected to provide more insights on the relationship.

Topalova's model incorporates two inequality measures - standard deviation of log of per capita expenditure and logarithmic deviation of per capita expenditure - as dependent variables. The present model differs with respect to inequality measure and takes Gini coefficient of total wage distribution, which is calculated for the state (in contrast to districts being the unit of study in Topalova, 2005) and its rural and urban sectors.

Also, her study uses tariffs of industries and converts them into state protection measures by taking employment shares of the respective industries as weights, to measure trade openness for districts of India. In contrast, present study takes the outcome measures as trade openness variable and calculates states' total trade (exports plus imports) as a percentage of NSDP.

Another difference is adoption of state level reform index developed by OECD (2007) as the measure of labour market institution for states in India, in contrast to labour market flexibility index developed by Besley & Burgess (2004) adopted in Topalova (op cit.). This index has been criticized extensively by Bhattacharjea (2006) based on its methodological and coverage limitations. This was discussed in detail in chapter 5, section 5.3.2.

Final difference is in the coverage, where present study incorporates data of 21 major states of India (including Delhi), in contrast to 16 major states covered earlier.

Given above points of differences, the present study further adds to existing research on the effect of trade openness on wage inequality which goes beyond the industry-level analysis, with more recent data under analysis and by incorporating different set of explanatory variables.

The study however, suffers from two limitations; first it only concentrates on labour income and not total income of the workers. The wage income does not incorporate other revenue sources of workers as capital or property income earned. Wages earned thus, represent a fraction of total income and hence, can provide only limited evidence on income inequality. The data for income inequality is not available for the Indian economy. As this chapter focusses on impact of trade openness on labour markets through its impact on wages, data for consumption inequality, though is available, is not used for the analysis. Second, wages of casual and regular labour employed in all sectors of the economy are included but the self-employed workers are excluded. This is so because, their income is mixed income and cannot be differentiated separately as wages, the distinction possible for both casual and regular labour of the economy.

6.4 Variables and Data Sources

6.4.1 Definition of variables and sources of data

The definitions of variables and their data sources are detailed below.

Wage Inequality: The Gini coefficient is taken as a wage inequality measure which is calculated as follows:

$$G = \frac{1}{2n^2\overline{w}} \sum_{1=1}^{n} \sum_{j=1}^{n} \left| w_i - w_j \right|$$

where n denotes number of individuals, $\overline{w}$ is mean of wage, w_i refers to individual i's income, and w_j refers to individual j's income. The Gini is computed for real weekly wages of states and rural and urban sectors. The activity status corresponding to the reference period of one week, known as current weekly status (CWS), has been employed. The earnings data provided by NSSO refers to wage / salary income received by wage/ salaried employees and casual labourers, for wage / salary work done during the reference week.

The weekly information on wages (earned in both cash and kind) has been utilized for calculation of Gini coefficient.[26] [27] The real weekly wages are computed by deflating nominal weekly wages using state-level consumer price indices for agricultural labourers (CPIAL) and for industrial workers (CPIIW) at the base 1982-83, for rural and urban wages respectively. The data for CPIAL and CPIIW is taken from Economic and Political Weekly Research Foundation (EPWRF).

The Gini coefficient is computed using data on individual wages for all regular and casual workers (aged between 15 to 65 years) employed in all economic sectors (agriculture, manufacturing - organised and unorganised and services). The earnings of self-employed workers are not provided in NSSO's surveys and hence, are excluded from the analysis.

The year of 2000 saw the formation of three new states of Chhattisgarh, Jharkhand and Uttaranchal. The boundaries of these new states have been considered

[26] The weekly earnings are taken because NSSO divides the wage / salary earners in regular and casual workers. The regular workers get paid for whole week, whereas casual workers get paid for only the days they have actually worked.

[27] The NSSO's Employment – Unemployment surveys provide data for different levels of activity undertaken in a week by an individual. The data for first prime activity is only taken into account. The first activity status accounts for around 90% of data for each round under study. The Gini coefficient was also calculated by taking four levels of activity during the week which covers around 98% of data. The Gini indices are quite similar in both cases. The Gini coefficient is computed by applying sampling weights. The values are similar to when calculated without weights as well.

to maintain consistency across years, even for period prior to the year 2000. The inequality measures for the new states for the period before 2000 are therefore calculated separately from unit records for 38th, 43rd and 50th rounds. Bihar, Madhya Pradesh and Uttar Pradesh in pre 2000 data thus refer to present geographical regions represented by these states.

Two measures of deflators are available to calculate real wages from nominal wages. One is the implicit price index calculated from official poverty lines of the states. This had been used in Cain et.al. (2010b), accounting for consumption inequality in India. The study discusses its advantages as it would account for both inflation and spatial price differences across two sectors (rural and urban) of the states. But the disadvantage is that limitations and deficiencies in calculation and updating of the official poverty lines will also get incorporated in implicit price indices calculated from them. The calculation of poverty lines in India have been criticised on many grounds over the years and a brief discussion on this issue is presented in chapter 3, section 3.3.3 of the study. The second way is to use CPIAL and CPIIW to calculate real wages for the rural and urban areas, respectively. In light of above mentioned limitations of the former, present study employs CPIAL and CPIIW as deflators for calculating real wages for the empirical exercise.

Trade Variable: The state's total trade (i.e. exports plus imports) as a percentage of NSDP is taken as a measure of trade openness for states in India (as is done in the empirical exercise of previous two chapters). The details of methodology followed for calculation of exports and imports of states are discussed in chapter 3.

Labour Market Institutions: The OECD index of labour reforms in states given in OECD (2007) has been taken as a measure of labour market institution of the states of India. This index was also used in the empirical analysis of the previous chapter. A brief description of this measure and other available state level measures of labour market institution is provided in chapter 5, section 5.3.2.

Control Variables: There are three control variables used in the empirical exercise namely, per capita NSDP; proportion of literate population in each state; number of graduates and above in the population of each state. The data for state NSDP per capita is taken from CSO at current prices, which are then converted to constant 2004-05 prices. The proportion of literates and number of graduates & above in population (more than 6 years of age) of each state is calculated from data of the NSSO

Employment and Unemployment survey rounds.[28] Literate is defined as a person of age 7 and above, who can both read and write in a language with understanding. The literacy rate in India is defined as proportion of literates in population (more than 6 years of age) and is called as the effective literacy rate. The NSSO also reports maximum level of education attained by individuals and using that information, number of people with educational qualification of graduation and more is calculated.

6.4.2 Measures of Wage Inequality

There are various ways of measuring wage inequality and few important measures used for studying the effect of trade liberalization on wage inequality are discussed below (in ascending order of broadness of the measure):

(i) Skill Premium i.e. skilled to unskilled wage ratio: The skilled-unskilled wage ratio has been used widely as a wage inequality measure in studies primarily focussing on manufacturing sector, such as Jansen & Lee (2007), Hasan & Jandoc (2010), Pavcnik et.al. (2004), Dutta (2004 & 2007) and Kumar & Mishra (2008). The skilled and unskilled workers are defined as: One, the skilled labour is defined on the basis of education of the head of household (as those possessing college graduate degrees or above). Second, the distinction between skilled and unskilled labour is done by looking at participation in the production activity i.e. whether employed in production and non-production activity, or are blue-collared and white-collared workers. However, this measure suffers from two main limitations. Firstly, it is a very narrow measure of inequality and when calculated only for manufacturing sector it leaves out other sectors of the economy from analysis. Secondly, it would not capture the inequality that prevails between different groups in wage distribution.

(ii) Wage Differential: The three different measures of wage differential commonly used are, ratio of 90^{th} percentile to 10^{th} percentile wage (90-10 wage ratio), median to 10^{th} percentile wage ratio (50-10 wage ratio) and 90^{th} percentile to median wage ratio (90-50 wage ratio). As the names suggest these measures are constructed by using different percentile of wages, rather than using wages of all wage earners in wage distribution and hence, serve different purposes in the inequality analysis (Sadhukhan, 2013). The 90-10 wage ratio for an industry i measures wage inequality between 90^{th} percentile and 10^{th} percentile wage earners in that industry and hence measures wage inequality between upper and lower wage earners. Similarly, the ratio of median to 10^{th}

[28] Sampling weights are used to derive population level for these two rates.

percentile captures wage inequality within wage earners at bottom half and 90-50 wage ratio helps to understand wage inequality within wage earners at upper half in the wage distribution.

(iii) Gini coefficient of Wages: Gini coefficient of wages is the most popular inequality measure. The Gini coefficient can be measured from a distribution of any variable w_i, where i = 1, 2, …….. , n as follows:

$$\text{Gini} = \frac{1}{2n^2\bar{w}} \sum_{1=1}^{n} \sum_{j=1}^{n} |w_i - w_j|$$

$$= 1 + \left(\frac{1}{n}\right) - \left(\frac{2}{n^2\,\bar{w}}\right) [w_1 + 2w_2 + \cdots + nw_n]$$

where n denotes number of individuals, $\bar{w}$ is mean of wage, w_i refers to individual i's income, and w_j refers to individual j's income. The Gini coefficient takes values from minimum zero to maximum one, where value of 0 implies a perfectly equal society and a value of 1 implies a perfectly unequal society.

(iv) Generalized Entropy (GE) measures – Three measures included here are; the mean log deviation, the Theil index and half the squared coefficient of variation: These measures are computed as follows (Dutta, 2005):

$$\text{GE } (\alpha) = \frac{1}{\propto^2 - \propto} \left[\frac{1}{n} \sum_{i=1}^{n} \left(\frac{w_i}{\bar{w}}\right)^{\propto} - 1\right]$$

where α is a parameter which denotes the weight given to distances between wages at different parts of wage distribution. The three measures of inequality of GE class are defined based on values of α, most commonly taken values being 0, 1 and 2. The above expression is not defined for α equal to 0 and 1 and hence GE (0) and GE (1) are calculated using L' Hopital's Rule. A value of α = 0 gives the mean log deviation measure and implies that more weight is given to distances between wages in the lower end of distribution.

$$\text{GE } (0) = \frac{1}{n} \sum_i ln \frac{w_i}{\bar{w}}$$

The value of α = 1 gives the Theil index and it applies equal weights across the distribution.

$$\text{GE } (1) = \frac{1}{n} \sum_i \left(\frac{w_i}{\bar{w}}\right) ln \left(\frac{w_i}{\bar{w}}\right)$$

The value of α = 2 gives third measure i.e half the squared coefficient of variation and it gives proportionately higher weight to distances in the upper part of distribution.

$$\text{GE } (2) = \frac{1}{2}\left[\frac{1}{n}\sum_{i=1}^{n} \left(\frac{w_i - \bar{w}}{\bar{w}}\right)^2\right]$$

These measures also calculate the wage inequality amongst all wage earners in the wage distribution.[29]

The present analysis use Gini coefficient as a measure of wage inequality. The Gini coefficient is computed using data on individual wages earned (both in cash and kind) for all workers (15 – 65 years of age) engaged in wage employment in the economy. It thus, helps to better understand the wage inequality among all wage earners in wage distribution. Also, since trade liberalization can affect wages in any part of wage distribution, it is considered to be better to analyse impact on wage inequality using the Gini coefficient. Another advantage of using this measure is that the coefficient satisfies three basic properties a standard inequality index should follow; the mean independence, the population size independence, and the Pigou-Dalton condition (defined by Foster & Sen, 1997). The mean or scale independence means that index remains constant if all incomes are proportionately change; the population size independence implies that proportionate change in population at each income level keeps index invariant; and Pigou-Dalton condition means that the transfer from rich to poor, without changing their relative ranks, would lead to fall in index value.[30]

6.5 Descriptive Statistics of Wage Inequality

The table 6.1 below presents Gini coefficient and three GE measures of real weekly wages calculated for India and its rural and urban areas for each year. The wage inequality in rural India has been increasing from 1993-94 to 2004-05 and declines thereafter. However, the urban wage inequality shows an increasing trend till 2009-10, dropping only marginally in 2011-12. The same trend is shown by all inequality measures under consideration. For the period as a whole, rural Gini has declined from 0.43 to 0.39 and urban Gini has increased from 0.54 to 0.56. The Gini for India hence shows only a marginal decline from 0.50 to 0.49. The theil measure of inequality i.e. GE (1) has also declined for rural sector of India from 0.35 to 0.32, whereas it increased for the urban sector from 0.35 to 0.48 for the period of 1993 to 2011. The increase in

[29] These measures of inequality can also be used to calculate broader variants of inequality i.e. income / consumption inequality. According to Deaton (1997), measure of inequality taking consumption as the base is the ideal measure as it compares the well-being of the individuals over their entire lifetime. But very few empirical studies have exploited this measure, largely due to the problem of availability of consumption data in many countries. The studies related to India though, measure consumption expenditure inequality as NSSO collects data on household level consumption of various food and non-food items.

[30] These three basic properties that a standard inequality index should follow are also satisfied by three generalized entropy measures (Dutta, op. cit).

inequality (in the urban areas) between 1993 and 2009, suggests growth in wages has been higher for the richer individuals than for poorer individuals.

Table 6.1: Various Inequality Estimates of Real Weekly Wages of India by Sector

Sector / Measure	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
Rural Sector					
Gini	0.4332	0.4488	0.4678	0.4083	0.3963
GE (0)	0.3541	0.3431	0.3744	0.2896	0.2746
GE (1)	0.3525	0.4074	0.4530	0.3415	0.3195
GE (2)	0.5406	0.9785	0.8908	0.5988	0.5668
No. of Observations	84574	60333	42264	33776	32680
Urban Sector					
Gini	0.4556	0.4830	0.5169	0.5220	0.5084
GE (0)	0.4245	0.4164	0.4860	0.4872	0.4656
GE (1)	0.3492	0.4095	0.4789	0.4907	0.4769
GE (2)	0.4305	0.6277	0.9294	0.7959	0.7883
No. of Observations	67896	47365	31032	27569	27236
Total – Both Sectors					
Gini	0.5046	0.5148	0.5329	0.5169	0.4941
GE (0)	0.4752	0.4556	0.4920	0.4598	0.4207
GE (1)	0.4588	0.5053	0.5547	0.5367	0.4883
GE (2)	0.6911	0.9923	1.1922	1.0599	0.9463
No. of Observations	152470	107698	73296	61345	59916

Source: Author's calculation using data of various NSSO survey rounds.

Dutta (2005) calculated the wage inequality measures for two categories of wage / salary earners i.e. casual and regular workers. The data indicated an increase in wage inequality among regular workers for the period of 1983 to 1999. The Gini coefficient was stable at around 0.40 till 1993 but increased to 0.43 in 1999. However, this pattern was found to be reversed for casual workers and data revealed declining inequality between 1983 and 1999. Sarkar & Mehta (2010) also calculated inequality measures for earnings of wage workers for both casual and regular workers for the period of 1983 to 2004. The three important points emerging were firstly, reduction in inequality of casual workers which was more pronounced in pre reform period. Secondly, regular wage workers of rural areas experienced a decline in wage inequality in pre-reform period, but it increased substantially after that. However, the inequality had been increasing in both pre and post reforms periods in urban areas though only marginally in the earlier period and substantially in the later period. Thirdly, inequality among casual workers had been lower than the regular workers, for both rural and urban areas and for the whole period.

Mehta & Hasan (2012) described the evolution of wage inequality in the production sectors of India (focussed on urban wage and salaried workers only) and in aggregate. They reported four measures of inequality - Gini, GE (0), GE (1) and GE (2) - and found the increase in all four measures of inequality between 1993 and 2004. The Gini coefficient had risen from 0.42 in 1993 to 0.49 in 2004. The inequality was also found to be increasing in six out of nine production sectors. In a similar fashion, the measures of inequality were calculated for the manufacturing labour of different manufacturing groups over the years by Sadhukhan (2013). The data shows an increasing trend of wage inequality measures over the period of 1993-2009. The Gini coefficient declined for all manufacturing groups for the period of 1993 to 1999 (from 0.48 to 0.45). However, it increased thereafter to 0.49 in 2004 and 0.50 in 2009.

Table 6.2 below shows the Gini coefficient for five time points between 1993-94 and 2011-12 for rural and urban sectors of all states under study. Almost all states experience a decline in wage inequality in their rural areas over this period. Many states experience an increase in inequality till 2004-05 and the decline thereafter. Few exceptions are Assam, Delhi, Himachal Pradesh and Uttaranchal. For the urban areas of states, in contrast, Gini coefficient shows an increasing trend till 2009-10, dropping marginally in 2011-12 compared to 2009-10. The exceptions are Assam, Delhi, Haryana and Uttar Pradesh. The levels of inequality are relatively higher in urban areas and the difference increased more in decade of 2000s as compared to the previous decade. The correlation coefficient between rural and urban gini values are 0.14 (1993-94), 0.11 (1999-00), -0.03 (2004-05), 0.10 (2009-10) and 0.16 (2011-12).

Table 6.2: Gini Coefficient of Real Weekly Wages of the States

	Rural					Urban				
State	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**	**1993-94**	**1999-00**	**2004-05**	**2009-10**	**2011-12**
Andhra Pradesh	0.38	0.38	0.42	0.34	0.33	0.49	0.50	0.55	0.48	0.48
Assam	0.36	0.43	0.40	0.42	0.46	0.40	0.45	0.46	0.46	0.51
Bihar	0.40	0.37	0.37	0.31	0.32	0.49	0.48	0.57	0.54	0.51
Chhattisgarh	0.44	0.44	0.43	0.38	0.34	0.44	0.49	0.53	0.60	0.55
Delhi	0.31	0.49	0.29	0.34	0.41	0.40	0.45	0.48	0.44	0.47
Goa	0.42	0.42	0.35	0.32	0.31	0.36	0.36	0.39	0.36	0.36
Gujarat	0.42	0.45	0.44	0.39	0.41	0.43	0.46	0.47	0.49	0.42
Haryana	0.38	0.42	0.56	0.45	0.37	0.42	0.42	0.41	0.49	0.54
Himachal Pradesh	0.41	0.44	0.45	0.47	0.45	0.36	0.37	0.46	0.44	0.45
Jharkhand	0.42	0.46	0.46	0.35	0.41	0.41	0.51	0.52	0.55	0.53
Karnataka	0.41	0.41	0.39	0.33	0.34	0.50	0.49	0.53	0.50	0.47
Kerala	0.36	0.37	0.42	0.39	0.37	0.42	0.42	0.45	0.48	0.47
Madhya Pradesh	0.36	0.41	0.43	0.36	0.34	0.44	0.49	0.52	0.51	0.51
Maharashtra	0.46	0.47	0.52	0.46	0.45	0.44	0.46	0.53	0.55	0.52
Orissa	0.42	0.46	0.47	0.46	0.38	0.43	0.48	0.51	0.51	0.50
Punjab	0.29	0.36	0.45	0.37	0.35	0.37	0.45	0.48	0.52	0.49
Rajasthan	0.42	0.39	0.40	0.35	0.37	0.39	0.44	0.49	0.50	0.47
Tamil Nadu	0.46	0.45	0.44	0.41	0.38	0.49	0.49	0.53	0.49	0.46
Uttar Pradesh	0.44	0.47	0.45	0.39	0.40	0.42	0.49	0.50	0.53	0.57
Uttaranchal	0.44	0.41	0.47	0.48	0.49	0.32	0.45	0.45	0.52	0.49
West Bengal	0.40	0.40	0.45	0.38	0.37	0.45	0.49	0.52	0.56	0.56
CV of Gini	11.37	8.84	13.08	13.10	12.73	11.25	8.69	9.31	9.98	9.77

Source: Author's calculation using data of various NSSO survey rounds.

The trends in wage inequality are similar to that for consumption Gini coefficient calculated from household consumption surveys. The extent of rural and urban inequality in India is discussed in chapter 3, section 3.4.4. Cain et.al. (2010b) calculated Gini indices and generalised entropy measures of per capita consumption expenditure for rural and urban areas of India for the period 1983 to 2004. For rural areas, all inequality estimates showed a decline between 1983 and 1993, whereas for urban areas, all estimates (except GE (2)) increased, though only marginally. For the later period i.e.1993 to 2004, all inequality estimates increased in both the rural and urban sectors. However, increases in rural areas were found to be marginal (Gini

increased from 0.285 to 0.298) but were larger for urban areas (Gini increased from 0.342 to 0.378).

6.6 Analysis of the Regression Results

6. 6.1 Regression Results

The panel OLS estimation results of equation (4) for total state and its rural and urban sectors are presented in Table 6.3.[31] The chosen model from both Hausman and Mundlak approaches is fixed effects for total state and for its rural sector and random effects for urban sector of the states.

The dummy variable to capture the high growth period of India after the year 2000 (dtime) was included in final specification of the model. The results of this final specification are presented in the table below. An important point to consider is that these results would not give the level effect of trade openness on wage inequality. The results capture the relative impact on the states that are more or less open to trade and hence, studies unequal effects of trade openness on wage inequality in the states.

The results for total state (rural and urban combined) indicate that trade openness does not significantly affect Gini coefficient of real wages of the states. The coefficient of interaction term of trade openness and flexibility of labour market institution is also not found to be significant. The variables that are negatively and significantly affecting Gini coefficient of the states are log of per capita NSDP and log of literacy rate with coefficient of -0.08 and -0.17 respectively. However, coefficients of log of number of graduates in each state and dummy variable for high growth phase in the Indian economy are found to be positive and significant with values of 0.04 and 0.07 respectively.

With respect to the rural areas, Gini coefficient is not found to be significantly affected by both trade openness and it's interaction with flexibility of labour market institution. Only log of literacy rate is found to be negatively and significantly affecting the Gini coefficient with coefficient value of -0.14. The coefficients for log of number of graduates and dummy variable though are positive and significant but values are low

[31] The results of FE and RE specifications of the three regressions are given in Appendix 6.1. The choice between the two specifications is based on Hausman test and Mundlak formulation, which is also presented in the tables in Appendix 6.1. To choose final specification of the model, Mundlak formulation is given preference over Hausman test wherever contradictory results emerge as it is based on robust standard errors, as opposed to non-robust standard errors in Hausman test statistic.

at 0.04 and 0.07 respectively. The Gini coefficient of rural areas of the states have been declining over the period under study and from these results one can say that literacy rate is an important contributor to this fall. Trade openness is not an important factor affecting the wage inequality of rural parts of India.

The results for urban areas however indicate that trade openness positively (coefficient value of 0.12) and significantly (at 10% level of significance) affect Gini coefficient with a lag of one year, although interaction term of trade openness and labour market flexibility indicator is not found to be significant. Log of literacy rate is not significantly affecting urban Gini. Log of per capita NSDP only affects Gini coefficient negatively and significantly but value is very low at -0.06. The coefficients of log of number of graduates and dummy variable are positive and significant. The wage inequality in urban areas of India had been increasing till 2009-10 with only a marginal decline in 2011-12. The results indicate that trade openness is one of the factors for this increase. The increase in per capita incomes lead to fall in the wage inequality but dummy variable for high growth phase indicates that the overall growth process led to rise in inequality, especially in urban areas.

Overall, it is observed that trade openness is not affecting wage inequality in India except in urban areas of the country. The labour market institutions of states do not play important role in affecting wage inequality. Per capita NSDP and literacy rate are important factors for reduction of wage inequality in India. Another interesting aspect emerging from the results is that higher education levels lead to wage inequality in India and high growth phase of the economy has also attributed to it. This is true not only when the states are taken as a whole but also when rural and urban areas are studied separately.

Table 6.3: Panel Data Estimates of the Wage Inequality Equation for the States

Dependent Variable : Gini of Real Wage			
Variables	**Total**	**Rural**	**Urban**
L. Tradelag	-0.0379 (-0.62)	-0.0386 (-0.53)	0.1192 (1.69)*
L. Tradelag*labour institution	0.0040 (1.49)	0.0014 (0.42)	-0.0037 (-1.16)
L. Per Capita NSDP	-0.0855 (-2.6)**	-0.0658 (-1.45)	-0.0647 (-2.13)**
L. Literacy Rate	-0.1675 (-3.05)***	-0.1364 (-1.98)*	-0.0853 (-1.10)
L. Graduates Population	0.0372 (3.92)***	0.0380 (2.89)***	0.0325 (4.39)***
Dtime (2004 - 2011)	0.0732 (3.86)***	0.0673 (2.21)**	0.0740 (5.38)***
L. Tradelag-M #			-0.0695 (-0.95)
L. Tradelag*labour institution-M #			0.0028 (0.90)
L. Per Capita NSDP-M #			0.0502 (1.43)
L. Literacy Rate-M #			-0.0275 (-0.19)
L. Graduates Population - M #			-0.0069 (-1.06)
Constant	1.3383 (4.98)***	1.0887 (2.75)**	0.6331 (1.47)
R square within R square between R square overall	0.32 0.30 0.25	0.21 0.00 0.01	0.60 0.68 0.64
Test Statistic for Joint Significance of Slope Coefficients	F(6,20) = 3.60 Prob > F = 0.01	F(6,20) = 3.33 Prob > F = 0.02	Wald chi2(11) = 313.51 Prob > chi2 = 0.00
Selected Model	FE	FE	RE
Observations No. of States	105 21	105 21	105 21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with robust standard errors are reported for FE and RE models, respectively.
The reported R square is within R square for FE models and overall R square for RE models.
The variables specified with 'M' are additional variables created for Mundlak formulation, calculated as Xi = $\overline{Xt}$.

6.6.2 Discussion of Results

The above empirical analysis concludes that trade openness leads to increase in wage inequality only in urban areas and has no impact on rural areas of the states of

India. The labour market institutions of states neither increases nor diminishes the impact of trade openness on inequality. This adverse impact of trade had also been demonstrated by other studies such as Mehta & Hasan (2012), which focussed on the wage inequality and Topalova (2005), which focussed on the consumption inequality. The former calculated wage inequality of the urban workers in all production sectors and the later study calculated consumption inequality for all economic sectors of rural and urban areas.

The results presented here raise some interesting questions such as: (i) what are the main reasons that trade openness is either leading to no effect on wage inequality or increasing it, for the Indian economy, contradicting the standard theory of trade given by Stolper Samuelson; (ii) why this adverse impact of trade is occurring only in urban areas and not in rural areas of the states; (iii) what are the other important factors leading to rising wage inequality in India; especially in urban areas.

Mehta & Hasan (2012) and Ramaswamy (2008) tried explaining this contradiction appearing in their results for the Indian economy. The important explanations given are:

(a) Skill biased technological changes induced by trade i.e. skill-biased technology inflow increases the productivity of skilled-labour. This induces relative increase in demand and wages for skilled labour, thereby increasing the wage inequality (in developing countries like India), also termed as 'skill-enhancing trade hypotheses'. The other reason for this relative increase in skilled labour demand is given by Sen (2008). This study analysed the effect of trade liberalization on relative skill intensity in manufacturing sector for the period of 1973-1997. Their findings showed that trade liberalization had statistically significant negative impacts on wage inequality. The decrease in trade barriers led to an increase in unskilled-labour intensive imports, which reduced relatively the demand for unskilled labour. This then led to an increase in wage inequality between the two types of workers. Ramaswamy (2008) observed the rise in skill premium in both export-oriented and import-competing industries in India. This led to a demand shift in favour of skilled-workers in total employment. Pant & Barua (2014) developed a model to explain trade liberalization leading to increase in wage inequality in the developing countries and demonstrated that differences in their productivities is the reason for the emergence of inequality. The model thus, suggests that trade may increase wage inequality in developing countries.

(b) Trade in intermediate products: According to Feenstra & Hanson (2003), if a developing country is trading in intermediate goods then implications of trade openness on wage inequality would not be conforming to the trade theory. Firms in the developed countries tend to "outsource" few intermediate products or stages of production to developing countries as it reduces the cost of production. These products or processes, though are unskilled-labour intensive in a developed country, but compared to production activities of the developing countries these are skilled-labour intensive. This results in shift in favour of skill intensive exports in developing countries and raises demand for skilled labour and hence wages inequality, as is also happening in India.

(c) Barriers to domestic mobility of the factors: Domestic labour regulations have been argued as important determinant of the effect of trade liberalization on wage inequality. The regulations could restrict the ability of firms to adjust the mix of workers' skills in response to trade openness. According to Ramaswamy (2008), firms in India responded by employing workers on temporary or contractual contracts. There was also outsourcing of production to the informal sector. For example, the share of casual labour increased rapidly after trade liberalization from 26.3 percent in 1990-91 to 34.2 percent in 2009-10 in India. Since causal labour earns less than regular labour, rising casualization would push more and more labour to low-wage category, thereby increasing wage inequality.

The rural inequality though is decreasing, is not found to be affected by trade openness in our results. The urban inequality is increasing and also is positively related with trade openness. This can be analysed by looking at following factors pertaining to the Indian economy:

(a) The pattern and composition of India's exports. In the urban sector, trade openness is leading to rise in wage inequality due to the composition of exports and more emphasis on skilled labour intensive exports of manufacturing industries which are mostly located in urban areas. The share of primary products in exports in India is around 15%. The manufacturing share in merchandise exports is around 70%. The sectors that have grown rapidly in merchandise exports are skilled-labour-intensive such as chemicals and allied products and engineering goods. Another major export item of gems and jewelleries also require services of highly skilled labour. The unskilled-labour-intensive sectors such as leather manufactures and readymade garments are growing at much slower rates (Panagariya, 2004). This led to doubling of share of capital and skilled labour intensive products in exports from 25% to 54% in

the period of 1993 to 2010. In the same period, share of unskilled labour intensive goods dropped from 30% to 15% (Veeramani, 2012). Thus despite India being the exporter of various agricultural goods, it cannot be perceived as exporter of relatively unskilled labour-intensive goods for analysing the impact on wage inequality due to trade openness. The study by Pant & Barua (2014) also developed a model which suggested the relevance of structure of trade (and not just volume or composition of trade) for wage inequality. Their proposition is, "in small countries with a large unskilled labour force specific to the agricultural sector, increased trade leads to a decrease in wage inequality if the export sector is more intensive in the use of the intermediate agricultural good". It shows that for developing countries like India, agricultural sector products, where large employment is of unskilled labour, are not used in the export sector. The stagnation of exports of unskilled labour intensive sectors of manufacturing sector is a cause for increasing urban wage inequality. These are the sectors that could have absorbed unskilled agricultural labour, but are not doing so. This is the reason why wage inequality in rural sector is not impacted by trade openness.

(b) The productivity of the firms increased but benefits were not passed on to workers leading to increase in wage inequality. Aghion et.al. (2008) and Topalova (2004) found that trade liberalization increased firm productivity in India. But they also found positive impact of trade liberalization on wage inequality in manufacturing industry. This implied that either workers didn't share the benefits of trade-induced increases in productivity or the benefits were not sufficient to compensate the fall in factor returns; thereby increasing the wage inequality.

(c) According to Topalova (2005), another factor important is that agriculture had been left out from the reforms. Thereby, people were not able to move out from the subsistence agriculture to manufacturing or services sectors due to rigid labour markets. She also observed that those areas were experiencing increasing growth and reduction in poverty where labour markets were flexible and relocation was easier. But in those areas benefits of liberalization were reaped more by population at high income levels leading to change in income distribution in their favour and also increase in the consumption inequality. Saha (2015) developed a model of labour demand and examined determinants of contract labour usage for the states of India. The results showed that increased trade exposure (measured by increasing import penetration) and pro worker labour institutions, led to greater informalisation of formal labour markets, as reflected by regular workers being substituted by contract workers in the

manufacturing firms. The present study however, differs in this respect and shows that flexibility or rigidity of the labour markets does not substantially or significantly affect the relationship between trade openness and wage inequality. It neither accentuates nor diminishes the effect as is reflected by small value of coefficient (also is not significant, even at 10% of confidence) of interaction term of trade openness and index of flexibility of labour markets of the states.

(d) The rural to urban migration had gone up in last few years, but it only led to movement of people to low wage informal sector in urban areas. According to the data for two NSSO rounds of 1999-00 and 2007-08, around 1/4th of migrants constituted rural to urban (increased from 20.9% in 1 999-00 to 23.3% in 2007-08) followed by urban-urban and urban to rural. The main reason for migration for females was marriage (dominant flow is from rural to rural), whereas for males the main reason was employment and dominant flow was from rural to urban. This rural to urban migration is largely motivated by the availability of employment in urban informal sector. According to Goldar & Aggarwal (2012), increased international competition led to increase in informal labour in the industrial sector. This is because cost benefit achieved due to lower wages of the informal labour helps to improve competitiveness. This trend led to increase in wage inequality of the urban areas. Muralidharan et.al. (2014) compared the nominal wages of workers and supervisory and managerial staff in the manufacturing sector of India during 1999-2000. The data combining all industries for 2008-09 showed that supervisory and managerial employees earned the highest annual daily nominal wage rate (Rs 818), whereas contract workers earned the least (Rs 191). It implies that wage rate for the former was 421% higher than that of contract workers. The supervisory and managerial employees earn this wage premium over contract workers; more so in the private sector (468%) than in the public sector (327%). Thus, the wage fund is shared wherein, wages of workers grow at a small rate which gets crowded out by the rising inflation and the managerial staff earns perceptible premiums thereby contributing to wage inequality increases in the urban sectors.

The other factors that are found to be important (in our results) in explaining the wage inequality in India are graduate population in the states and dummy for high growth phase of the economy. The return to education is important determinant of wages and hence to account for this, two control variables - literacy rate and number of graduates in total population are introduced in the model. The latter is found to be positively and significantly affecting wage inequality for the total states and also its

rural and urban sectors. Literacy rate however, is found to be negatively and significantly affecting Gini coefficient of wages for the total state and its rural sub component. These two results imply that the states with higher literacy rates experience lower wage inequality but the higher number of graduates in population leads to higher wage inequality of the states. This is due to increase in skilled labour demand but commensurately the supply has not increased which has led to increased wage differentials at the graduates and above level, thereby leading to increase in wage inequality. Sarkar & Mehta (2010) calculated the mean wage differential for pre and post liberalization periods and stated that for the later period, the differential increase was marginal at secondary level but was substantial at graduate and above level. This inequality effect of the above secondary level educational categories in the later period is in accordance to greater growth in wages of supervisory and managerial workers.

The similar results of higher returns to education are presented in Cain et.al. (2010b), Kijima (2006) and Chamarbagwala (2006). According to them, since 1990s, returns to education and inequality has been increasing in the urban sector. The service sector expanding at a fast rate in India is employing more highly educated individuals. This is pushing the demand and earnings for the highly educated as they are relatively scarce. They also found the evidence of trade leading to rise in demand for workers with educational degree of graduation and above.

6.6.3 Robustness Checks of Regression Results

The robustness tests of empirical results are carried out in following manner. Firstly, two explanatory variables, per capita NSDP and literacy rate of the states have high correlation coefficients of 0.73 and 0.64 for rural and urban areas, respectively and hence, one of these two variables was dropped from the regression. The results are presented in columns 1 (per capita NSDP is dropped) and 2 (literacy rate is dropped) of the tables 6.4, 6.5 and 6.6 (for state as whole; rural and urban areas of the states respectively). Secondly, principal component of these two variables is calculated and incorporated in the regression. The results of this specification are given in column 3 of the tables below. Thirdly, the log of graduate population (found to be most significantly affecting the wage inequality) was replaced by log of proportion of graduates in each state and the results are given in column 4. The following are fixed effects regression results with robust standard errors of these different specifications of the model.

Table 6.4: Robustness Tests of the Panel Data Estimates of the Wage Inequality Equation for the States

Dependent Variable : Gini of Real Wage				
Variables	**(1)**	**(2)**	**(3)**	**(4)**
L. Tradelag	-0.0941 (-1.36)	-0.0812 (-1.04)	-0.0438 (-0.68)	-0.0797 (-1.21)
L. Tradelag*labour institution	0.0044 (1.44)	0.0047 (1.34)	0.0040 (1.50)	0.0041 (1.44)
L. Literacy Rate	-0.1333 (-2.05)*			-0.0438 (-0.79)
L. Graduate Population	0.0213 (2.04)*	0.0152 (2.56)**	0.0371 (3.70)***	
Dtime (2004 - 2011)	0.0460 (2.58)**	0.0379 (2.84)***	0.0726 (3.76)***	0.0221 (2.73)**
L. Per Capita NSDP		-0.0672 (-1.80)*		-0.0430 (-0.93)
PCA (Literacy Rate & PCNSDP)			-0.0586 (-3.77)***	
L. Proportion of Graduates				0.0322 (0.74)
Constant	0.7244 (5.46)***	0.8726 (3.40)***	-0.2101 (-1.05)	1.0178 (1.99)*
R square within	0.20	0.20	0.31	0.15
Observations	105	105	105	105
No. of States	21	21	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively. The numbers in parentheses are 't' statistic with robust standard errors.

Table 6.5: Robustness Tests of the Panel Data Estimates of the Wage Inequality Equation for the Rural Areas of the States

Dependent Variable : Gini of Real Wage				
Variables	**(1)**	**(2)**	**(3)**	**(4)**
L. Tradelag	-0.0832	-0.0748	-0.0408	-0.0246
	(-1.01)	(-0.88)	(-0.51)	(-0.30)
L. Tradelag*labour institution	0.0017	0.0019	0.0014	-0.0006
	(0.51)	(0.47)	(0.42)	(-0.17)
L. Literacy Rate	-0.1154			-0.0750
	(-1.66)			(-1.86)*
L. Graduate Population	0.0257	0.0169	0.0380	
	(2.14)**	(1.81)*	(2.88)***	
Dtime (2004 - 2011)	0.0472	0.0344	0.0672	0.0107
	(1.93)*	(1.64)	(2.22)**	(0.60)
L. Per Capita NSDP		-0.0500		-0.0446
		(-1.08)		(-1.07)
PCA (Literacy Rate & PCNSDP)			-0.0514	
			(-2.22)**	
L. Proportion of Graduates				0.0616
				(3.33)***
Constant	0.6438	0.7724	-0.1358	1.2408
	(4.03)***	(2.33)**	(-0.54)	(3.25)***
R square within	0.17	0.15	0.21	0.20
Observations	105	105	105	105
No. of States	21	21	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively. The numbers in parentheses are 't' statistic with robust standard errors.

Table 6.6: Robustness Tests of the Panel Data Estimates of the Wage Inequality Equation for the Urban Areas of the States

Dependent Variable : Gini of Real Wage				
	(1)	**(2)**	**(3)**	**(4)**
L. Tradelag	0.0810 (1.09)	0.1161 (1.70)	0.1071 (1.50)	0.0684 (0.87)
L. Tradelag*labour institution	-0.0036 (-1.00)	-0.0036 (-1.17)	-0.0039 (-1.17)	-0.0021 (-0.59)
L. Literacy Rate	-0.0991 (-1.21)			0.1986 (2.19)**
L. Graduate Population	0.0256 (3.91)***	0.0266 (5.97)***	0.0339 (4.62)***	
Dtime (2004 - 2011)	0.0610 (5.47)***	0.0653 (6.35)***	0.0746 (5.65)***	0.0421 (4.20)***
L. Per Capita NSDP		-0.0670 (-2.25)**		-0.0238 (-0.78)
PCA (Literacy Rate & PCNSDP)			-0.0260 (-2.31)**	
L. Proportion of Graduates				-0.0285 (-0.71)
Constant	0.5166 (1.73)*	0.6369 (2.66)**	-0.0972 (-0.78)	-0.1918 (-0.46)
R square within	0.57	0.60	0.59	0.52
Observations No. of States	105 21	105 21	105 21	105 21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively. The numbers in parentheses are 't' statistic with robust standard errors.

The first robustness test of removing one of two correlated variables from the regression equation, reveals that results remain more or less similar. The coefficient for trade openness continues to be negative and not significant for the regressions of total state and rural sector of the states (Columns 1 and 2 of tables 6.7, 6.8 and 6.9). However, when the results of urban areas are compared, the coefficient of trade openness is found to be positive and not significant, which was earlier positively and significantly affecting wage inequality in the results given in table 6.6. The coefficients values of other variables are similar, though there are few changes in the level of significance of coefficients in first two specifications given above. This is also found to be true for rural sector.

The next robustness test results (of incorporating principal component of two correlated variables) also show similarity with the previous set of results. As stated above, the results for total state and its rural sector remain same. The coefficient of

trade openness changes from being significant in main results to being not significant here. The same analysis holds for the third robustness test (of replacing the variable of log of number of graduates with the log of proportion of graduates in states) also.

This raises some doubt regarding the robustness of positive and significant impact of the trade openness on wage inequality of urban areas of the states. The previous set of results showed that the states with higher trade openness experiences increases in wage inequality. These set of robustness results show that the effect is not found to be significant. However, coefficient's sign is not reversing and hence, it still does not imply that trade openness reduces wage inequality in India. At best, one can say that it has not found to be significantly impacting wage inequality in the states of India.

6.7 Summary & Conclusion

This chapter empirically examines the impact of trade openness on wage inequality using panel data for 21 states of India and for its rural and urban sectors for the period of post liberalization reforms of India. The available literature largely focus on impact of trade openness on manufacturing industry's wage inequality. The present study extends the analysis to state level, which captures the effects on wage inequality of workers in agricultural, manufacturing and services sectors.

The Gini coefficient is taken as a measure of wage inequality, which is computed for real weekly wages of both casual and regular employees of the state. The trade openness measure is taken as sum of exports and imports of the state as a percentage of NSDP. The regression equation also incorporates a measure of labour market institution of the state and other control variables such as per capita NSDP, literacy rate, number of graduates and above in the population and dummy variable for high growth rate period of after 2003.

The results show that trade openness (with a lag of one year) has no significant effect on wage inequality in the rural sector and the state as a whole. However, a significant and positive relationship is observed in the urban sector. The results also indicate that this impact is not affected by the presence of more flexible labour market institutions in states. The empirical evidence does not support the Hecksher – Ohlin and Stolper – Samuelson model of trade and indicate that trade openness do not result in decrease in wage inequality. This study provides support to the argument that different

regions in India experience differential impacts of trade openness but this is found to be true only for the urban India.

The important factors explaining the result of either positive or no effect of trade openness on wage inequality are: (i) skill biased technological changes induced by trade, which increases demand and wages for skilled labour, thereby increasing the wage inequality. (ii) Trade in intermediate products, which are skilled-labour intensive in a developing country and hence again increases the demand and wages of skilled labour. (iii) Barriers to domestic mobility of factors, which restrict the ability of firms to adjust the mix of workers' skills in response to trade openness.

However, urban inequality has been found to be positively related to trade openness. This can be explained by the following factors: (i) the pattern and composition of exports. The trade openness is increasing in wage inequality because export sector is not utilizing comparative advantage of the country that lies in semi or unskilled labour concentrated activities. More than 60% of the population is dependent on agriculture but the unskilled labour intensive products in exports decreased from 30% to 15% over the period of 1993 to 2010. At the same time, the capital-intensive products have doubled from 25% to 54% in exports. (ii) The productivity of the firms has gone up but the benefits have not been passed on to workers leading to rise in wage inequality. (iii) In recent years rural to urban migration has largely been motivated by availability of employment in urban informal sector.

Three robustness checks were conducted which raises some doubt regarding the positive and significant impact of trade openness on wage inequality of urban sectors of the states. However, the sign of coefficient is not reversed and hence, the robustness checks also do not imply that trade openness reduces the wage inequality in India. At best, one can say that it has not found to be significantly impacting wage inequality in the states of India.

Amongst the control variables, per capita NSDP is found to be negatively and significantly affecting wage inequality in the urban sector but is not significant for the rural sector. The literacy rate of a state is negatively and significantly affecting wage inequality except in urban sector of the states. The number of people with educational degree of graduation and above in a state and the dummy variable for high growth phase are two variable found to be positively and most significantly affecting wage inequality in every regression.

From these results, one can say that for the rural sector, literacy rate plays an important role in decreasing wage inequality, whereas growth process followed in the economy and increase in education of individuals lead to rise in inequality. For urban sector, trade openness is not the only factor causing the increase in wage inequality. Accompanied by it are other factors i.e. high growth phase and rising number of graduates in the population.

The path of Indian growth process has been such that though trade openness is increasing employment (as shown in the previous chapter 5), but the gains to employment are skewed towards the minority of Indian labour force i.e. the higher educated (tertiary education and above) class of professionals and managers; especially in the services sector. The data from NSSO also reveals that for the period of 1993 and 2004, the per capita expenditures of households headed by individuals in these professions with higher education, have experienced the largest increase (Cain et.al. 2010b). The bulk of labour is stuck in low paying contractual jobs in urban informal sector. This is unlike other developing economies where, manufacturing sector growth fuelled growth process in the economy leading to creation of employment and increase in wages of the unskilled labour (factor with comparative advantage).

Thus, as stated by Panagariya (2008), "the challenge of transformation facing India is that of creating an environment that allows unskilled-labour-intensive manufacturing to grow rapidly and rise as a proportion of the gross domestic product". This would alter the pattern of employment growth and would lead to faster movement of labour out of the agriculture sector. The labour productivity in agriculture would rise in consequence, leading to growth in the wages of unskilled / low skilled labour in non-agricultural sector (Ghose, 2015). This process of increasing employment in the manufacturing sector and simultaneously raising productivity and wages in agriculture sector is expected to help India fight the inequality and exploit the beneficial impact of trade.

Chapter 7
Summary and Conclusion

There has been much debate about whether trade liberalization helps reduce poverty and inequality in a country. The question remains largely an empirical one, as trade creates both winners and losers. This study attempted to empirically analyse the impact of trade liberalization on poverty in India.

India followed liberalization process in 1991 as a consequence of balance of payments and fiscal crisis. A series of liberalization reforms like removal of licencing requirements for industries, drastic reduction in tariff rates, removal of non-tariff barriers and current and capital account convertibility of exchange rate, were pursued. These reforms led to high growth in the merchandise trade and increased share of India in world exports. The share of merchandise trade in GDP increased from 28.2 percent in 2004-05 to 42 percent in 2013-14. The share in world exports increased from 0.7 percent to 1.7 percent for the period of 2000 to 2013. The share in world imports also rose from 0.8 percent to 2.5 percent for the same period (Economic Survey, 2015).

During the period of reforms, the Indian economy achieved a steady accelerated growth. GDP per capita was increasing at the growth rate of 3 percent in the 1980s, 4 to 5 percent since 1991 and is growing at more than 6 percent in the recent decades (Economic Survey, 2015). The evidence suggests that incidence of poverty declined since the period of reforms. All poverty measures exhibit larger proportionate reductions in the post-1991 period. The poverty ratio fell from 54.9 percent in 1973-74 to 45.3 in 1993-94 and further to 37.2 percent in 2004-05 (Planning Commission estimates). Poverty depth almost halved in the same period. The fall in the proportion of population in poverty was three times faster at 9.9% between 1993-94 and 1999-2000, as compared to 2.9% decline between 1987-88 and 1993- 94 (Himanshu, 2007). However, India has been experiencing an increase in the inequality measured as the Gini coefficient of per capita monthly expenditure.

An important area of concern is whether trade liberalization reforms started in 1990s helped or hindered the observed decline in poverty reduction in India. There is a huge literature analysing the impact of trade openness on poverty. There are diversity of methods and approaches examining this relationship. The relationship is not direct and it operates via different channels (Winters, 2000a). Conventional trade theory distinguishes between the static (further categorized into households, distribution,

factor markets and government) and dynamic (via growth and inequality) effects of trade liberalisation. The review of theoretical and empirical literature leads to the conclusion that there is no universal agreement on the effect of trade openness on poverty across countries. The relationship has also been found to be dependent on various domestic factors, policies and institutions present in the countries and hence, it is more appropriate to undertake country specific studies.

The study thus, aimed to analyse three important channels of the effects of trade openness on poverty in India. The study first incorporated the most important effect of income growth and inequality (dynamic effect) and further analysed the impact of trade openness on the factor markets (static effects) by looking at labour market and hence, the impact on unemployment rate and wage inequality. Thereby, the study proceeded with the following three objectives:

(1) Whether trade openness affects per capita income and income distribution, leading to poverty reduction in India.

(2) Whether trade openness through the impact on labour market reduces unemployment, thereby helping to reduce poverty in India.

(3) Whether trade openness through the impact on labour market reduces wage inequality, thereby help reducing poverty in India.

The objectives were empirically tested using the panel data for 21 major states of India. The data for three important variables, poverty incidence, unemployment rate and wage inequality, were taken from household surveys conducted by the NSSO. As the period under study is post 1991 reforms, the data for five thick survey rounds for the years 1993-94, 1999-2000, 2004-05, 2009-10 and 2011-12, has been used for the analysis.

A pre requisite for state level analysis is to construct a measure of trade openness for the states of India (as trade data is available only at the national level). The measures available in the literature cannot be used due to various limitations such as, the number of states and the time period covered are smaller than used in the present study; the measures do not provide the estimates of nominal value of both exports and imports of the states; or they provide ranks or index for the states. The study attempted to refine and modify the available measures present, to estimate the exports and imports of the states. The exports plus imports as a percentage of NSDP had been used as a measure of trade openness of the states.

The first objective was analysed by building on PGI triangle given by Bourguignon (2003) and incorporating trade openness to determine its impact on poverty through the effects on growth and inequality. The literature provided sound arguments for the existence of two way relationship between - trade openness and growth; growth and inequality. Hence, the simultaneous equation model consisting of a system of four equations for trade openness, per capita net state domestic product (PCNSDP), poverty and inequality, was constructed to take care of endogeneity of these variables. The model was estimated using the panel data OLS and 2SLS methodology.

The econometric estimates of the relations between the four endogenous variables showed that PCNSDP is negatively influencing the poverty rate and hence higher the PCNSDP of the states, lower is their poverty rate. Trade openness is found to be positively impacting PCNSDP, so the states which are trading more, experience higher PCNSDP. Also, PCNSDP is found to be positively influencing trade openness of the states. From the presence of these significant relations, we can conclude that trade openness leads to poverty reduction through its positive impact on growth. The two way relation between PCNSDP and inequality is not found to be significant and trade openness is also not significantly influencing the inequality.

The elasticity of poverty with respect to trade openness is calculated to be equal to -1.64. However it increases to -1.7, when only significant coefficients are taken into consideration. Thus, with such a high elasticity, trade openness is expected to play a significant role in poverty reduction, through its impact on PCNSDP (and no impact on inequality from either trade openness or PCNSDP).

The reduced form estimates of model were also presented to determine the exogenous variables that significantly impact these four endogenous variables and hence, are important for the objective of poverty reduction in India. The proportion of working population is found to have the highest impact for increasing PCSNDP and reducing poverty incidence. The proportion of graduates and above in the population is also found to be beneficial for increasing PCNSDP (and trade openness) and reducing poverty incidence, but is also found to increase inequality. The per capita government expenditure (depicting the fiscal policy of the government) is found to be positively impacting trade openness and poverty incidence, though leads to increase in inequality.

The second objective was examined by taking the unemployment rate of the state and also separately for their rural and urban sectors. The trade openness measure with a lag of one year, measure of the labour market institution for the states and other

control variables such as per capita NSDP, proportion of working population and dummy variable for high growth phase of the Indian economy post 2003, were taken as the independent variables in the panel regression. The final results showed that the increase in trade openness leads to significant reduction in total unemployment rates of states, with an elasticity of -1.52. The elasticity of -1.8 for the rural areas of the states is found to be significant. However, for the urban areas of the states, the estimated elasticity is not found to be significant.

The results also found that the negative effect of trade openness on the unemployment rate is higher and stronger for relatively flexible states by taking the interaction term of trade openness and labour market flexibility indicator in the regression. Thus, we found evidence that trade liberalization reduces unemployment in states and more so in the states with flexible labour markets. This effect is also found to be stronger for rural parts of the states than their urban counterparts, implying that the rural sector is driving the results of total states and is dominant in explaining unemployment situation of the country.

Thus, our results conform to the theory that trade openness increases employment in the developing countries; more so of unskilled workers and hence, a movement away from the rural agricultural sector of the economy. The argument is supported by the evidence of the increase in population mobility from 24.8 percent in 1993 to 28.5 percent in 2007-08 in India. The data for internal migration showed a shift from rural agricultural to rural non-agricultural and urban sectors of the economy. The prominent reason for migration for females was marriage and the dominant flow was from rural to rural whereas for males, the prominent reason was employment and the dominant flow was from rural to urban (NSSO 2007–2008). The upsurge of urban informal sector in the post liberalization era, accompanied by increase in employment opportunities, have been the main motivation behind this rural to urban migration across states of India (Chakraborty & Kuri, 2013).

The third objective was empirically analysed by taking the Gini coefficient as a wage inequality measure. The Gini coefficient is computed for real weekly wages of both casual and regular employees of the state and also for the rural and urban sectors, separately. The independent variables included were measure of the labour market institution of the state and other control variables such as per capita NSDP, literacy rate, number of graduates and above in the population and dummy variable for high growth period post 2003.

The results showed that wage inequality in the rural sector and the state as a whole is not impacted significantly by the trade openness. A significant and positive impact (coefficient value of 0.12) is observed for the urban sector. The results also indicated that this impact is not affected by the presence of more flexible labour market institutions in the states. The robustness tests had put some doubts regarding this significant impact observed for the urban sector. However, the results were not reversed but only showed no significant effect of trade openness on the wage inequality in the urban sectors.

These result of no effect of trade openness on wage inequality or increasing the wage inequality in the urban sector is contradictory to the theory. This had been analysed and explained by various factors present in the Indian economy such as, skill biased technological changes; trade in intermediate goods; barriers to domestic labour mobility; pattern and composition of India's exports and agriculture sector being left out of the reforms.

The results showed that there are other important determinants impacting wage inequality of states. Per capita NSDP and literacy rate are found to be reducing and higher education levels and high growth phase of the economy increasing the wage inequality. This holds true for both rural and urban areas of the states, in the separate regressions. Thus, we can say that literacy rate has been an important contributor to the decline in the wage inequality experienced in rural areas. The increase in wage inequality of the urban areas can be attributed to an extent to the trade openness, but more important factors are high growth and high education levels experienced by the economy over the past three decades.

The important implications are emerging from the results discussed above. The extent of trade liberalization followed has led to growing volumes of exports and imports, which helped in raising the per capita income levels in the economy. According to our empirical results, this has substantially impacted the poverty reduction, as it led to fall in poverty incidence in India. Further, our results showed that consumption inequality (though increasing overtime) is not getting adversely affected by the per capita income or trade openness.

This positive impact of trade openness is countered by the results of labour markets in both rural and urban sectors of the economy. Our results also showed the beneficial effect of trade openness on employment of the country. The results are found to be significant for rural sector of the country but insignificant for the urban sector.

The effect is stronger for states where labour markets are relatively more flexible. However, the results indicated the negative effect of trade openness on the wage inequality, especially in the urban sector.

In this perspective, the structural change expected from the trade liberalization has not been achieved by the Indian economy. Though unemployment is reducing in the rural sector, as people are moving from agricultural to non-agricultural employment in urban areas, the wage inequality (and also consumption inequality) is increasing in urban India. However, the rate of growth of non- agricultural sectors' employment is a cause of concern. The organised manufacturing sector's employment is growing at a slow rate and largely, employment of informal workers is increasing in this sector. In addition, employment in both unorganised services and non-manufacturing industry, especially construction, is growing (Mehrotra et.al, 2014). These households, getting employed in the growing informal sector, predominantly lie in lower deciles of the consumption expenditure and are vulnerable to fall in and out of poverty with a small change.

The gains of trade openness and accompanying high growth are skewed towards the small class of the labour force of India (concentrated in the services sector) i.e. the higher educated (tertiary education and above) comprising of professionals and managers; whereas the bulk of labour is stuck in low paying contractual employment in the urban informal sector. The trade liberalization did not generate higher employment in tradable and high productive sectors of the economy and the gains were confirmed to certain sections of the population, leaving out a vast majority with wide ramifications. This has been perceived as an important limitation of the recent growth trajectory followed by the Indian economy.

Thus, what is relevant is to combine policies of trade liberalization that promotes growth, with the appropriate policies to help participation of the poor in the opportunities generated by growth. The public policies to address the process of economic growth and the rising inequalities in the wake of liberalization is crucial and is a real challenge facing the developing countries of the world, like India. This would ensure higher and more effective poverty reduction than would otherwise be possible.

The study contributes to the literature in various ways. The effect of trade openness on poverty is analysed by taking three different channels of impact making it more comprehensive than the available literature (largely focussing on only one of these channels). The study also tried to take a step further in terms of methodology;

broadening the definition of variables under the study; coverage of states; and time period for the empirical analysis. In the first hypothesis, the study has attempted to build a set of simultaneous equations for analysing the impact of trade on poverty through these two important channels of growth and inequality. The literature has largely focussed on studying these causal relations independently in single equation set up. Such analysis fails to study the inter relations between these variables and also fails to take into account the endogeneity of these variables in the empirical analysis.

The studies on the Indian economy analysing the trade – poverty relationship via factor / labour markets suffer from one important limitation of restricting themselves to the organized manufacturing sector (hence, mostly concentrating on the urban sector). To correct for this limitation, the present study covered the entire economy (agriculture, organised and unorganised manufacturing and services sectors) by analysing the unemployment and wage inequality in rural and urban sectors of the states. Also, the existing evidence on wage inequality have concentrated more on narrower measures of inequality (skill premium or industry wage pemia) but the present study has taken a broader measure of inequality - Gini coefficient and calculated the wage inequality amongst all wage earners in the wage distribution. The study extended the coverage of the analysis by incorporating the data for 21 major states of India (the related studies take 15 or 16 major states) and by incorporating data of the latest two thick rounds of NSSO survey of 2009-10 and 2011-12 (not yet included in studies on this subject).

One of the limitations of the study is that it is based on the partial equilibrium approach and hence general equilibrium analysis of impact of trade on poverty through all the channels taken together, would be out of the scope of this study. Also, as pointed out in the review, trade openness impacts poverty through various channels, but the study focussed on only three channels as specified above, leaving out other channels such as the micro impact of changes in prices (due to trade openness) on the consumption and production of households and the impact on the government revenue.

The study opens ample opportunities for future course of research. The simultaneous equation model used to analyse the impact of trade openness on poverty through the effects on growth and inequality assumed log-linear relations between all variables. There is scope to improve and modify the model for further research, specifically by incorporating nonlinearities in the model. The present study concentrated on the aggregate poverty and its correlates but the effects of trade reforms

are not constant at all levels. Some people would have gained and escaped poverty and some would have fallen into poverty, keeping the aggregate more or less constant. This kind of analysis cannot be undertaken using the NSSO data, as it is not a panel data at the household level. The survey data that tracks the same households overtime, would be fruitful to study these transitions and effects on different segments of population more clearly. Poverty is now increasingly seen in multi-dimensional terms defining human well-being (Sen, 1999 and Alkire & Foster, 2007) though, most empirical studies (and so is the present study) are still relying on simple income or consumption measures of poverty. Lastly, the impact of trade openness on other correlates of poverty like the impact on transitional unemployment; informal labour market of the economy and the effects of trade liberalization on gender (Winters & Martuscelli, 2011) have not been studied extensively for the Indian economy.

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Appendix 1.1

States included in the Study

1. Andhra Pradesh
2. Assam
3. Bihar
4. Chhattisgarh
5. Delhi
6. Goa
7. Gujarat
8. Haryana
9. Himachal Pradesh
10. Jharkhand
11. Karnataka
12. Kerala
13. Madhya Pradesh
14. Maharashtra
15. Orissa
16. Punjab
17. Rajasthan
18. Tamil Nadu
19. Uttar Pradesh
20. Uttaranchal
21. West Bengal

Appendix 4.1

Table 4A.1: Panel Data OLS Estimates of the Poverty Equation

Variables	Fixed Effects (1)	Random Effects (2)	Mundlak Formulation (3)	Final_Fixed Effects with robust SEs (4)
L.PCNSDP	-1.3893 (-6.64)***	-1.1532 (-8.92)***	-1.3881 (-7.33)***	-1.3893 (-7.64)***
L. Gini	0.7377 (2.24)**	0.6164 (2.11)**	0.7419 (1.70)*	0.7377 (1.77)*
L. PC Government Expenditure	0.0152 (0.81)	0.0073 (0.41)	0.0152 (1.62)	0.0152 (1.69)
L. Share of Agriculture	-0.2133 (-1.24)	-0.1371 (-1.43)	-0.2118 (-1.08)	-0.2133 (-1.14)
L. Population Growth Rate	-0.0695 (-1.01)	-0.0187 (-0.29)	-0.0692 (-0.78)	-0.0695 (-0.81)
L. Inflation	0.0538 (0.82)	0.0192 (0.32)	0.0539 (1.13)	0.0538 (1.17)
L.PCNSDP - M #			0.6184 (2.27)**	
L. Gini-M #			-0.2774 (-0.34)	
L. PC Government Expenditure – M #			-0.0916 (-1.26)	
L. Share of Agriculture- M #			0.1513 (0.56)	
L. Population Growth Rate-M #			0.1984 (0.84)	
L. Inflation-M #			0.0608 (0.16)	
Constant	15.3349 (6.04)***	13.2445 (8.29)***	10.0902 (3.63)***	15.3349 (5.50)***
Year Dummies	No	No	No	No
R square within R square between R square overall	0.80 0.73 0.73	0.79 0.74 0.74	0.80 0.78 0.79	0.80 0.73 0.73
Test Statistic for Joint Significance of Slope Coefficients	F(6,57) = 37.57 Prob > F = 0.00	Wald chi2(6) = 249.14 Prob > chi2 = 0.00	Wald chi2(12) = 275.21 Prob > chi2 = 0.00	F(6,20) = 97.94 Prob > F = 0.00
Hausman p value	0.18			
Mundlak test for Random Effects			chi2(6) = 20.51 Prob > chi2 = 0.00	
Selected Model	Random Effects		Fixed Effects	
Observations No. of States	84 21	84 21	84 21	84 21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.

The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with non-robust standard errors are reported for initial FE and RE models. The 't' / 'Z' statistic with robust standard errors are reported for Mundlak formulation and selected model.
The reported R square is within R square for FE models and overall R square for RE models.
The variables specified with 'M' are additional variables created for Mundlak formulation, calculated as Xi = $\overline{Xi}$.

Table 4A.2: Panel Data OLS Estimates of the Income Equation

Dependent Variable : Log of PCNSDP				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation (3)**	**Final_Fixed Effects with robust SEs (4)**
L. Trade	0.6610 (5.49)***	0.3635 (3.82)***	0.6620 (3.73)***	0.6610 (3.87)***
L. Gini	0.1264 (0.63)	-0.1226 (-0.57)	0.1210 (0.60)	0.1264 (0.66)
L. PC Government Expenditure	0.0010 (0.09)	0.0306 (2.35)	0.0009 (0.06)	0.0010 (0.07)
L. Working Population Proportion	0.4723 (1.04)	2.4758 (6.15)***	0.4616 (1.43)	0.4723 (1.52)
L. Proportion of Graduates	0.2372 (2.26)**	0.6551 (9.01)***	0.2365 (1.71)*	0.2372 (1.78)*
L. Inflation	0.0658 (1.72)*	0.0094 (0.21)	0.0658 (2.10)**	0.0658 (2.20)**
L. Trade-M #			0.0329 (0.16)	
L. Gini-M #			-0.5279 (-1.49)	
L. PC Government Expenditure-M #			0.1137 (2.77)***	
L. Working Population Proportion-M #			2.4378 (3.25)***	
L. Proportion of Graduates-M #			0.5386 (3.47)***	
L. Inflation-M #			0.3459 (2.38)**	
Constant	5.0527 (2.58)**	-2.1447 (-1.17)	-5.7491 (-2.04)**	5.0527 (3.81)***
Year Dummies	No	No	No	No
R square within R square between R square overall	0.91 0.71 0.65	0.88 0.93 0.89	0.91 0.96 0.94	0.91 0.71 0.65
Test Statistic for Joint Significance of Slope Coefficients	F(6,57) = 99.38 Prob > F = 0.00	Wald chi2(6) = 532.53 Prob > chi2 = 0.00	Wald chi2(12) = 16363 Prob > chi2 = 0.0000	F(6,57) = 99.38 Prob > F = 0.00
Hausman p value	0.00			
Mundlak test for Random Effects			chi2(6) = 228.50	

			Prob > chi2 = 0.00	
Selected Model	Fixed Effects		Fixed Effects	
Observations	84	84	84	84

Notes: Same as in Table 4A.1.

Table 4A.3: Panel Data OLS Estimates of the Trade Openness Equation

Dependent Variable : Log of Trade Openness				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation (3)**	**Final_Fixed Effects with robust SEs (4)**
L.PCNSDP	0.8577 (9.49)***	0.7040 (7.28)***	0.8574 (6.18)***	0.8577 (6.40)***
L. PC Capital Expenditure	0.0261 (1.80)*	0.0278 (1.42)	0.0261 (1.87)*	0.0261 (1.93)*
L. Share of Credit	0.1050 (1.02)	-0.0640 (-0.64)	0.1052 (0.60)	0.1050 (0.62)
L. Population Growth Rate	0.0381 (0.89)	-0.0175 (-0.29)	0.0381 (0.76)	0.0381 (0.79)
L. Inflation	-0.0220 (-0.61)	0.0579 (1.10)	-0.0219 (-0.67)	-0.0220 (-0.69)
L.PCNSDP - M #			-0.5250 (-3.01)***	
L. PC Capital Expenditure-M #			-0.1212 (-1.86)*	
L. Share of Credit-M #			-0.2920 (-1.32)	
L. Population Growth Rate-M #			-0.0042 (-0.02)	
L. Inflation-M #			-0.1557 (-0.46)	
Constant	-5.813 (-9.52)***	-3.828 (-5.42)***	1.667 (2.70)***	-5.813 (-6.75)***
Year Dummies	No	No	No	No
R square within R square between R square overall	0.90 0.07 0.32	0.88 0.11 0.38	0.90 0.38 0.79	0.90 0.07 0.32
Test Statistic for Joint Significance of Slope Coefficients	F(5,58) = 107.49 Prob > F = 0.00	Wald chi2(6) = 190.82 Prob > chi2 = 0.00	Wald chi2(12) = 714.24 Prob > chi2 = 0.0000	F(5,20) = 104.32 Prob > F = 0.00
Hausman p value	0.00			
Mundlak test for Random Effects			chi2(5) = 129.48 Prob > chi2 = 0.00	
Selected Model	Fixed Effects		Fixed Effects	
Observations	84	84	84	84

Notes: Same as in Table 4A.1.

Table 4A.4: Panel Data OLS Estimates of the Inequality Equation

Dependent Variable : Log of Gini Coefficient				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation (3)**	**Final_Fixed Effects with robust SEs (4)**
L.PCNSDP	0.0602 (0.68)	0.0067 (0.13)	0.0600 (0.57)	0.0602 (0.60)
L. Trade	-0.0683 (-0.68)	-0.0118 (-0.25)	-0.0670 (-0.52)	-0.0683 (-0.55)
L. PC Capital Expenditure	0.0149 (1.78)*	0.0116 (1.44)	0.0149 (1.97)**	0.0149 (2.05)*
L. Population Growth Rate	-0.0040 (-0.14)	-0.0221 (-0.89)	-0.0042 (-0.15)	-0.0040 (-0.15)
L. Proportion of Graduates	0.1290 (1.88)*	0.1320 (2.70)***	0.1280 (1.70)*	0.1290 (1.78)*
L. Inflation	-0.0273 (-1.13)	-0.0309 (-1.35)	-0.0273 (-2.01)**	-0.0273 (-2.09)**
L.PCNSDP - M #			-0.2572 (-1.75)*	
L. Trade-M #			0.2974 (1.47)	
L. PC Capital Expenditure-M #			0.0041 (0.11)	
L. Population Growth Rate-M #			-0.1648 (-2.71)***	
L. Proportion of Graduates-M #			0.2431 (2.00)**	
L. Inflation-M #			0.0594 (0.43)	
Constant	2.8027 (4.10)***	3.1874 (7.38)***	3.9584 (5.62)***	2.8027 (3.63)***
Year Dummies	No	No	No	No
R square within R square between R square overall	0.42 0.32 0.35	0.41 0.40 0.40	0.42 0.59 0.52	0.42 0.32 0.35
Test Statistic for Joint Significance of Slope Coefficients	F(6,57) = 6.86 Prob > F = 0.00	Wald chi2(6) = 52.49 Prob > chi2 = 0.00	Wald chi2(12) = 253.97 Prob > chi2 = 0.0000	F(6,57) = 6.86 Prob > F = 0.00
Hausman p value	0.40			
Mundlak test for Random Effects			chi2(6) = 18.33 Prob > chi2 = 0.00	
Selected Model	Random Effects		Fixed Effects	
Observations	84	84	84	84

Notes: Same as in Table 4A.1.

Appendix 4.2

Table 4A.5: Panel Data 2SLS Estimates of the Poverty Equation

Dependent Variable : Log of Poverty Incidence			
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Final_Random Effects (3)**
L.PCNSDP	-1.3712 (-2.84)***	-1.2233 (-4.51)***	-1.2233 (-4.51)***
L. Gini	-0.4849 (-0.40)	-0.5577 (-0.67)	-0.5577 (-0.67)
L. PC Government Expenditure	0.0327 (1.16)	0.0271 (1.24)	0.0271 (1.24)
L. Share of Agriculture	-0.3271 (-1.08)	-0.2817 (-1.92)*	-0.2817 (-1.92)*
L. Population Growth Rate	-0.0941 (-1.21)	-0.0615 (-0.81)	-0.0615 (-0.81)
L. Inflation	0.0222 (0.19)	0.0042 (0.05)	0.0042 (0.05)
Constant	19.5708 (5.05)***	18.2530 (7.46)***	18.2530 (7.46)***
R square within	0.75	0.74	0.74
R square between	0.69	0.69	0.69
R square overall	0.69	0.69	0.69
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(6) = 17093 Prob > chi2 = 0.00	Wald chi2(6) = 179.59 Prob > chi2 = 0.00	Wald chi2(6) = 179.5 Prob > chi2 = 0.0000
Hausman p value	0.63		
Selected Model	Random Effects		
Observations	84	84	84
No. of States	21	21	21

Notes: '***', '**', and '*' imply 1 percent, 5 percent and 10 percent levels of significance respectively. The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models. The 't' / 'Z' statistic with non-robust standard errors are reported for FE and RE models, respectively.

Table 4A.6: Panel Data 2SLS Estimates of the Income Equation

Dependent Variable : Log of Per Capita NSDP			
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Final_Fixed Effects (3)**
L. Trade	1.3937 (4.50)***	0.1007 (0.26)	1.3937 (4.50)***
L. Gini	-0.3913 (-0.43)	-1.3267 (-1.82)*	-0.3913 (-0.43)
L. PC Government Expenditure	-0.0063 (-0.30)	0.0516 (2.63)***	-0.0063 (-0.30)
L. Working Population Proportion	0.6570 (0.99)	2.3313 (3.13)***	0.6570 (0.99)
L. Proportion of Graduates	-0.2228 (-0.93)	0.9572 (4.08)***	-0.2228 (-0.93)
L. Inflation	-0.0232 (-0.33)	0.0096 (0.11)	-0.0232 (-0.33)
Constant	4.4621 (1.46)	2.8532 (0.69)	4.4621 (1.46)
R square within R square between R square overall	0.84 0.00 0.17	0.80 0.86 0.83	0.84 0.00 0.17
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(6) = 334431 Prob > chi2 = 0.00	Wald chi2(6) = 345.94 Prob > chi2 = 0.00	Wald chi2(6) = 334431 Prob > chi2 = 0.00
Hausman p value $	0.00		
Selected Model	Fixed Effects		
Observations No. of States	84 21	84 21	84 21

Notes: '***', '**', and '*' imply 1 percent, 5 percent and 10 percent levels of significance respectively.
The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models.
The 't' / 'Z' statistic with non-robust standard errors are reported for FE and RE models, respectively.

Table 4A.7: Panel Data 2SLS Estimates of the Trade Openness Equation

Dependent Variable : Log of Trade Openness			
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Final_Fixed Effects (3)**
L.PCNSDP	0.9755 (9.16)***	0.8049 (6.62)***	0.9755 (9.16)***
L. PC Capital Expenditure	0.0143 (0.92)	0.0174 (0.83)	0.0143 (0.92)
L. Share of Credit	-0.0045 (-0.04)	-0.1369 (-1.20)	-0.0045 (-0.04)
L. Population Growth Rate	0.0343 (0.79)	-0.0173 (-0.29)	0.0343 (0.79)
L. Inflation	-0.0261 (-0.71)	0.0472 (0.89)	-0.0261 (-0.71)
Constant	-6.5667 (-9.25)***	-4.5279 (-5.21)***	-6.5667 (-9.25)***
R square within R square between R square overall	0.90 0.10 0.34	0.88 0.14 0.38	0.90 0.10 0.34
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(6) = 61414 Prob > chi2 = 0.00	Wald chi2(6) = 181.08 Prob > chi2 = 0.00	Wald chi2(6) =61414 Prob > chi2 = 0.0000
Hausman p value	0.00		
Selected Model	Fixed Effects		
Observations No. of States	84 21	84 21	84 21

Notes: '***', '**', and '*' imply 1 percent, 5 percent and 10 percent levels of significance respectively. The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models. The 't' / 'Z' statistic with non-robust standard errors are reported for FE and RE models, respectively.

Table 4A.8: Panel Data 2SLS Estimates of the Inequality Equation

Dependent Variable : Log of Gini Coefficient			
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Final_Random Effects (3)**
L.PCNSDP	-0.0860 (-0.46)	-0.0855 (-0.80)	-0.0855 (-0.80)
L. Trade	0.2522 (0.80)	-0.1426 (-1.06)	-0.1426 (-1.06)
L. PC Capital Expenditure	0.0096 (0.94)	0.0178 (1.70)*	0.0178 (1.70)*
L. Population Growth Rate	-0.0195 (-0.59)	-0.0260 (-0.97)	-0.0260 (-0.97)
L. Proportion of Graduates	-0.0045 (-0.03)	0.2744 (1.96)**	0.2744 (1.96)**
L. Inflation	-0.0398 (-1.35)	-0.0008 (-0.02)	-0.0008 (-0.02)
Constant	3.4608 (2.92)***	4.2661 (3.83)***	4.2661 (3.83)***
R square within R square between R square overall	0.31 0.08 0.02	0.34 0.30 0.31	0.34 0.30 0.31
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(6) = 125869 Prob > chi2 = 0.00	Wald chi2(6) = 46.05 Prob > chi2 = 0.00	Wald chi2(6) = 46.05 Prob > chi2 = 0.00
Hausman p value	0.64		
Selected Model	Random Effects		
Observations No. of States	84 21	84 21	84 21

Notes: '***', '**', and '*' imply 1 percent, 5 percent and 10 percent levels of significance respectively. The figures in parentheses are 't' statistic in case of FE models or 'Z' statistic in case of RE models. The 't' / 'Z' statistic with non-robust standard errors are reported for FE and RE models, respectively.

Appendix 4.3

Table 4A.9: Panel Data OLS Estimates of the Poverty Equation: Trade openness included as RHS variable

Dependent Variable : Log of Poverty Incidence				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation (3)**	**Final_Fixed Effects with robust SEs (4)**
L.PCNSDP	-1.0605 (-3.86)***	-1.0012 (-7.60)***	-1.0551 (-3.48)***	-1.0605 (-3.70)***
L. Trade	-0.3765 (-1.80)**	-0.1680 (-1.48)	-0.3771 (-1.41)	-0.3765 (-1.49)
L. Gini	0.7628 (2.36)**	0.6313 (2.17)**	0.7653 (1.50)	0.7628 (1.57)
L. PC Government Expenditure	0.0210 (1.12)	0.0073 (0.39)	0.0210 (2.17)**	0.0210 (2.29)**
L. Share of Agriculture	-0.2311 (-1.37)	-0.1225 (-1.44)	-0.2269 (-1.26)	-0.2311 (-1.35)
L. Population Growth Rate	-0.0593 (-0.88)	-0.0011 (-.02)	-0.0587 (-0.75)	-0.0593 (-0.80)
L. Inflation	0.0499 (0.78)	0.0285 (0.45)	0.0495 (1.01)	0.0499 (1.07)
L.PCNSDP - M #			-0.0826 (-0.22)	
L. Trade-M #			1.3628 (4.14)***	
L. Gini-M #			-0.1120 (-0.14)	
L. PC Government Expenditure-M #			0.0217 (0.36)	
L. Share of Agriculture-M #			0.0366 (0.18)	
L. Population Growth Rate-M #			0.2169 (1.59)	
L. Inflation-M #			0.0632 (0.31)	
Constant	13.1912 (4.78)***	12.1551 (8.01)***	9.1346 (4.43)***	13.1912 (3.82)***
Year Dummies	No	No	No	No
Test Statistic for Joint Significance of Slope Coefficients	F(7,56) = 33.93 Prob > F = 0.00	Wald chi2(7) = 242.79 Prob > chi2 = 0.00	Wald chi2(14) = 4583.5 Prob > chi2 = 0.0000	F(7,20) = 101.85 Prob > chi2 = 0.0000
R square within R square between R square overall	0.81 0.60 0.68	0.80 0.70 0.73	0.81 0.88 0.85	0.81 0.60 0.68
Hausman p value	0.00			

Mundlak test for Random Effects			chi2(7) = 65.15 Prob > chi2 = 0.00	
Selected Model	Fixed Effects		Fixed Effects	
Observations	84	84	84	84
No. of States	21	21	21	21

Notes: Same as in Table 4A.1

Table 4A.10: Panel Data 2SLS Estimates of the Poverty Equation: Trade openness included as RHS variable

Dependent Variable : Log of Poverty Incidence			
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Final_Random Effects (3)**
L.PCNSDP	-1.5681 (-2.10)**	-1.1182 (-4.53)***	-1.1182 (-4.53)***
L. Trade	0.2069 (0.37)	-0.1366 (-0.71)	-0.1366 (-0.71)
L. Gini	-0.6807 (-0.49)	-0.4303 (-0.54)	-0.4303 (-0.54)
L. PC Government Expenditure	0.0320 (1.05)	0.0271 (1.24)	0.0271 (1.24)
L. Share of Agriculture	-0.3488 (-1.06)	-0.2631 (-2.06)**	-0.2631 (-2.06)**
L. Population Growth Rate	-0.1042 (-1.18)	-0.0517 (-0.68)	-0.0517 (-0.68)
L. Inflation	0.0227 (0.18)	0.0164 (0.19)	0.0164 (0.19)
Constant	21.6074 (3.12)***	17.1370 (7.01)***	17.1370 (7.01)***
Year Dummies	No	No	No
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(7) = 14879 Prob > chi2 = 0.00	Wald chi2(7) = 181.79 Prob > chi2 = 0.00	Wald chi2(7) = 181.79 Prob > chi2 = 0.00
R square within	0.71	0.76	0.76
R square between	0.72	0.66	0.66
R square overall	0.68	0.69	0.69
Hausman p value $	0.96		
Selected Model	Random Effects		
Observations	84	84	84
No. of States	21	21	21

Notes: Same as in Table 4A.5

Appendix 4.4

Table 4A.11 Panel Data 2SLS Estimates of the Three Structural Equations: Inequality taken as Exogenous Variable

	Equation for		
Explanatory Variables	**L. PI**	**L. PCNSDP**	**L. Trade**
L.PCNSDP	-1.7852 (-5.71)***		0.9755 (9.16)***
L. Trade		-1.3339 (4.85)***	
L. Gini	0.8875 (2.54)**	0.2022 (0.81)	
L. PC Government Expenditure	0.0101 (0.52)	-0.0150 (-0.97)	
L. PC Capital Expenditure			0.0143 (0.92)
L. Share of Credit			-0.0044 (-0.04)
L. Share of Agriculture	-0.5036 (-2.07)**		
L. Population Growth Rate	-0.0838 (-1.18)		0.0342 (0.79)
L. Working Population Proportion		0.4746 (0.84)	
L. Proportion of Graduates		-0.2626 (-1.22)	
L. Inflation	0.1212 (1.56)	0.0061 (0.12)	-0.0261 (-0.71)
Constant	19.5681 (5.49)***	3.4680 (1.39)	-6.5664 (-9.25)***
Test Statistic for Joint Significance of Slope Coefficients	Wald chi2(6) = 20184.7 Prob > chi2 = 0.00	Wald chi2(6) = 390885.8 Prob > chi2 = 0.00	Wald chi2(6) = 61416.39 Prob > chi2 = 0.00
R square	0.78	0.86	0.90
Selected Model	FE	FE	FE
Observations	84	84	84
No. of States	21	21	21

Notes: '***', '**', and '*' imply significance levels of 1 percent, 5 percent and 10 percent respectively.
The numbers in parentheses are 't' statistic.
R square given is within R square.

Appendix 5.1

Table 5A.1: Panel Data Estimates of the Unemployment Equation for the States (Rural + Urban combined)

Dependent Variable : Log of unemployment rate				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation of RE (3)**	**Chosen Model (Fixed Effects) (4)**
L. Tradelag	-1.5255 (-2.70)***	-0.0870 (-0.39)	-1.5031 (-1.84)*	-1.5255 (-1.89)*
L. Tradelag* labour institution	0.0632 (2.58)**	-0.0146 (-2.27)**	0.0624 (1.74)*	0.0632 (1.79)*
L. Per Capita NSDP	-0.1475 (-0.65)	0.1898 (1.31)	-0.1536 (-0.55)	-0.1475 (-0.54)
L. Working Population Proportion	-1.8279 (-2.91)***	-1.1253 (-1.90)*	-1.8605 (-2.96)***	-1.8279 (-2.98)***
Dtime (2004 - 2011)	0.2113 (1.92)*	0.1563 (-1.42)	0.2104 (2.25)**	0.2113 (2.31)**
L. Tradelag-M #			1.5227 (1.34)	
L. Tradelag*labour institution-M #			-0.0790 (-2.04)**	
L. Per Capita NSDP-M #			0.1193 (0.27)	
L. Working Population Proportion-M #			5.0100 (1.95)*	
Constant	13.2134 (3.75)***	7.5782 (2.92)***	-8.0411 (-1.05)	13.2134 (3.45)***
R square within	0.22	0.09	0.22	0.22
R square between	0.37	0.31	0.44	0.37
R square overall	0.21	0.24	0.37	0.21
Test Statistic for Joint Significance of Slope Coefficients	F(5,79) = 4.37 Prob > F = 0.0015	Wald chi2(5) = 15.68 Prob > chi2 = 0.0078	Wald chi2(9) = 33.38 Prob > chi2 = 0.0001	F(5,20) = 4.10 Prob > F = 0.0100
Hausman p value	0.0176			
Mundlak test for Fixed v/s Random Effects			chi2(4) = 7.93 Prob > chi2 = .0943	
Selected Model	Fixed Effects		Fixed Effects	
Observations	105	105	105	105
No. of States	21	21	21	21

Notes: Same as in Table 4A.1

Table 5A.2: Panel Data Estimates of the Unemployment Equation for the States (Rural)

Dependent Variable : Log of unemployment rate				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation of RE (3)**	**Chosen Model (Fixed Effects) (4)**
L. Tradelag	-1.7791 (-2.00)**	-0.0288 (-0.09)	-1.7068 (-2.01)**	-1.7791 (-2.09)**
L. Tradelag* labour institution	0.0647 (1.67)*	-0.0178 (-2.26)**	0.0622 (1.76)*	0.0647 (1.85)*
L. Per Capita NSDP	0.3041 (0.85)	0.3511 (1.84)*	0.2861 (0.43)	0.3041 (0.46)
L. Working Population Proportion	-2.5136 (-2.54)**	-2.0188 (-2.31)*	-2.6011 (-3.15)***	-2.5136 (-3.15)***
Dtime (2004 - 2011)	0.2072 (1.20)	0.1899 (1.16)	0.2046 (1.99)**	0.2072 (2.06)*
L. Tradelag-M #			1.9857 (1.43)	
L. Tradelag*labour institution-M #			-0.0788 (-2.02)**	
L. Per Capita NSDP-M #			-0.5073 (-0.51)	
L. Working Population Proportion-M #			6.6584 (2.08)**	
Constant	12.0400 (2.17)**	9.4832 (2.62)***	-10.9030 (-1.19)	12.0400 (2.07)*
R square within R square between R square overall	0.18 0.27 0.10	0.13 0.20 0.17	0.18 0.34 0.27	0.18 0.27 0.10
Test Statistic for Joint Significance of Slope Coefficients	F(5,79) = 3.54 Prob > F = 0.0062	Wald chi2(5) = 16.94 Prob > chi2 = 0.0046	Wald chi2(9) = 22.24 Prob > chi2 = 0.0082	F(5,20) = 3.06 Prob > F = 0.0327
Hausman p value	0.0316			
Mundlak test for Fixed v/s Random Effects			chi2(4) = 8.51 Prob > chi2 = .0745	
Selected Model	Fixed Effects		Fixed Effects	
Observations	105	105	105	105
No. of States	21	21	21	21

Notes: Same as Table 4A.1.

Table 5A.3: Panel Data Estimates of the Unemployment Equation for the States (Urban)

Dependent Variable : Log of unemployment rate				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation of RE (3)**	**Chosen Model (Random Effects) (4)**
L. Tradelag	-1.4644	-0.1289	-1.4321	-1.4321
	(-2.65)***	(-0.68)	(-1.60)	(-1.60)
L. Tradelag* labour	0.0465	-0.0166	0.0454	0.0454
institution	(1.94)*	(-3.45)***	(1.23)	(1.23)
L. Per Capita NSDP	-0.1103	-0.0372	-0.1184	-0.1184
	(-0.5)	(-0.32)	(-0.39)	(-0.39)
L. Working Population	-0.7305	-0.4601	-0.7787	-0.7787
Proportion	(-1.19)	(-0.85)	(-1.44)	(-1.44)
Dtime (2004 - 2011)	0.1443	0.1116	0.1427	0.1427
	(1.34)	(1.09)	(1.44)	(1.44)
L. Tradelag-M #			1.6075	1.6075
			(1.40)	(1.40)
L. Tradelag*labour			-0.0628	-0.0628
institution-M #			(-1.66)*	(-1.66)*
L. Per Capita NSDP-M #			-0.1164	-0.1164
			(-0.26)	(-0.26)
L. Working Population			2.5333	2.5333
Proportion-M #			(1.49)	(1.49)
Constant	9.6507	7.7835	-0.3291	-0.3291
	(2.8)***	(3.48)***	(-0.06)	(-0.06)
R square within	0.27	0.20	0.27	0.27
R square between	0.41	0.46	0.52	0.52
R square overall	0.16	0.36	0.42	0.42
Test Statistic for Joint Significance of Slope Coefficients	F(5,79) = 5.79 Prob > F = 0.0001	Wald chi2(5) = 35.27 Prob > chi2 = 0.0000	Wald chi2(9) = 39.64 Prob > chi2 = 0.0000	Wald chi2(9) = 39.64 Prob > chi2 = 0.0000
Hausman p value	0.0362			
Mundlak test for Fixed v/s Random Effects			chi2(4) = 4.57 Prob > chi2 = .3340	
Selected Model	Fixed Effects		Random Effects	
Observations	105	105	105	105
No. of States	21	21	21	21

Notes: Same as Table 4A.1.

Appendix 6.1

Table 6A.1: Panel Data Estimates of the Wage Inequality Equation for the States (Rural + Urban combined)

Dependent Variable : Gini of Real Wage				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation of RE (3)**	**Chosen Model (Fixed Effects) (4)**
L. Tradelag	-0.0379 (-0.76)	0.0099 (0.49)	-0.0381 (-0.6)	-0.0379 (-0.62)
L. Tradelag*labour institution	0.0040 (1.91)*	0.0004 (0.63)	0.0040 (1.45)	0.0040 (1.49)
L. Per Capita NSDP	-0.0855 (-3.64)***	-0.0278 (-1.89)*	-0.0852 (-2.53)**	-0.0855 (-2.6)**
L. Literacy Rate	-0.1675 (-3.74)***	-0.0729 (-2.12)**	-0.1671 (-2.96)	-0.1675 (-3.05)***
L. Graduate Population	0.0372 (4.65)***	0.0169 (3.64)***	0.0371 (3.81)***	0.0372 (3.92)***
Dtime (2004 - 2011)	0.0732 (5.21)***	0.0353 (3.32)***	0.0730 (3.75)***	0.0732 (3.86)***
L. Tradelag-M #			0.1800 (2.1)**	
L. Tradelag*labour institution-M #			-0.0037 (-1.47)	
L. Per Capita NSDP-M #			0.0289 (0.68)	
L. Literacy Rate-M #			0.2527 (2.39)**	
L. Graduate Population-M #			-0.0164 (-1.19)	
Constant	1.3383 (6.62)***	0.7548 (6.36)***	-0.1348 (-0.36)	1.3383 (4.98)***
R square within R square between R square overall	0.32 0.30 0.25	0.24 0.34 0.29	0.32 0.60 0.52	0.32 0.30 0.25
Test Statistic for Joint Significance of Slope Coefficients	F(6,78) = 6.09 Prob > F = 0.00	Wald chi2(6) = 28.43 Prob > chi2 = 0.00	Wald chi2(11) = 117.83 Prob > chi2 = 0.0000	F(6,20) = 3.60 Prob > F = 0.01
Hausman p value	0.00			
Mundlak test for Fixed v/s Random Effects			chi2(5) = 11.88 Prob > chi2 = .036	
Selected Model	Fixed Effects		Fixed Effects	
Observations No. of States	105 21	105 21	105 21	105 21

Notes: Same as Table 4A.1.

Table 6A.2: Panel Data Estimates of the Wage Inequality Equation for the States (Rural)

Dependent Variable : Gini of Real Wage				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation of RE (3)**	**Chosen Model (Fixed Effects) (4)**
L. Tradelag	-0.0386 (-0.52)	-0.0377 (-1.57)	-0.0373 (-0.50)	-0.0386 (-0.53)
L. Tradelag*labour institution	0.0014 (0.44)	0.0004 (0.59)	0.0013 (0.39)	0.0014 (0.42)
L. Per Capita NSDP	-0.0658 (-1.90)*	-0.0054 (-0.32)	-0.0658 (-1.41)	-0.0658 (-1.45)
L. Litearcy Rate	-0.1364 (-2.37)**	-0.0020 (-0.05)	-0.1344 (-1.91)*	-0.1364 (-1.98)*
L. Graduate Population	0.0380 (3.13)***	0.0036 (0.63)	0.0377 (2.80)***	0.0380 (2.89)***
Dtime (2004 - 2011)	0.0673 (3.26)***	0.0094 (0.64)	0.0668 (2.13)**	0.0673 (2.21)**
L. Tradelag-M #			0.1494 (1.77)*	
L. Tradelag*labour institution-M #			-0.0005 (-0.16)	
L. Per Capita NSDP-M #			0.0149 (0.30)	
L. Literacy Rate-M #			0.2842 (3.26)***	
L. Graduate Population-M #			-0.033012 (-1.88)*	
Constant	1.0887 (4.03)***	0.5125 (3.60)***	-0.2320 (-0.69)	1.0887 (2.75)**
R square within R square between R square overall	0.21 0.00 0.01	0.12 0.01 0.02	0.21 0.35 0.27	0.21 0.00 0.01
Test Statistic for Joint Significance of Slope Coefficients	F(6,78) = 3.45 Prob > F = 0.00	Wald chi2(6) = 5.98 Prob > chi2 = 0.42	Wald chi2(11) = 51.14 Prob > chi2 = 0.00	F(6,20) = 3.33 Prob > F = 0.02
Hausman p value	0.00			
Mundlak test for Fixed v/s Random Effects			chi2(5) = 33.54 Prob > chi2 = 0.00	
Selected Model	Fixed Effects		Fixed Effects	
Observations	105	105	105	105
No. of States	21	21	21	21

Notes: Same as table 4A.1.

Table 6A.3: Panel Data Estimates of the Wage Inequality Equation for the States (Urban)

Dependent Variable : Gini of Real Wage				
Variables	**Fixed Effects (1)**	**Random Effects (2)**	**Mundlak Formulation of RE (3)**	**Chosen Model (Random Effects) (4)**
L. Tradelag	0.1233 (2.32)**	0.0407 (2.47)**	0.1192 (1.69)*	0.1192 (1.69)*
L. Tradelag*labour institution	-0.0039 (-1.70)*	-0.0009 (-1.98)**	-0.0037 (-1.16)	-0.0037 (-1.16)
L. Per Capita NSDP	-0.0656 (-2.76)***	-0.0270 (-2.21)**	-0.0647 (-2.13)**	-0.0647 (-2.13)**
L. Literacy Rate	-0.0882 (-1.14)	-0.0620 (-1.08)	-0.0853 (-1.10)	-0.0853 (-1.10)
L. Graduate Population	0.0329 (4.29)***	0.0242 (5.48)***	0.0325 (4.39)***	0.0325 (4.39)***
Dtime (2004 - 2011)	0.0744 (5.55)***	0.0613 (6.14)***	0.0740 (5.38)***	0.0740 (5.38)***
L. Tradelag-M #			-0.0695 (-0.95)	-0.06948949 (-0.95)
L. Tradelag*labour institution-M #			0.0028 (0.90)	0.00284231 (0.90)
L. Per Capita NSDP-M #			0.0502 (1.43)	0.05024023 (1.43)
L. Literacy Rate-M #			-0.0275 (-0.19)	-0.02749787 (-0.19)
L. Graduate Population-M #			-0.0069 (-1.06)	-0.0069 (-1.06)
Constant	0.9155 (3.07)***	0.5916 (3.31)***	0.6331 (1.47)	0.6331 (1.47)
R square within R square between R square overall	0.60 0.47 0.43	0.58 0.67 0.62	0.60 0.68 0.64	0.60 0.68 0.64
Test Statistic for Joint Significance of Slope Coefficients	F(6,78) = 19.90 Prob > F = 0.00	Wald chi2(6) = 146.24 Prob > chi2 = 0.00	Wald chi2(11) = 313.51 Prob > chi2 = 0.00	Wald chi2(11) = 313.51 Prob > chi2 = 0.00
Hausman p value	0.39			
Mundlak test for Fixed v/s Random Effects			chi2(5) = 2.87 Prob > chi2 = 0.72	
Selected Model	Random Effects		Random Effects	
Observations No. of States	105 21	105 21	105 21	105 21

Notes: Same as table 4A.1.